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New Family of IBM Computers for Summer?

By Peter L. Briggs

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Over the last five months Computerworld has assimilated facts, opinions, speculations, and gossip about IBM's "fourth generation."

The results of this investigation indicate that a new IBM computer family is in production today and will be available in the summer.

The principal features of the new series will be:

- Variable micrologic used for both instruction and execution processing alterable through software
- Built-in communications capabilities
- Cost/performance ratios improved by a factor of from 6 to 12 over standard present IBM 360s.

• Includes all models of high-speed mainframe memories similar to those introduced for the

'70/195

• No machine language compatibility, but much simpler conversion than that required by the move to the 360.

The family is dubbed the NS (new or next system). Before introducing the product line, IBM is almost certain to change its name.

Principled performance data may differ from those mentioned here as they are a function of IBM's market planning group. Historically, IBM has priced all its equipment to produce preplanned profit objectives. And current economic conditions may cause IBM to postpone the announcement of the new family until late in the year.

IBM continues to follow its standard policy regarding "speculative material" and would

not comment on the information in this article.

The variable micrologic concept allows the computer's entire instruction set to be altered through software. The logic of an ADD instruction can be changed to produce different results from the same data.

The entire process of accessing a data element from an indexed sequential file could be microprogrammed into the hardware and executed as a single instruction (READ, for example) in machine language.

Reports indicate that variable micrologic was first justified as a solution to maintenance and debugging problems.

Variable micrologic also offers a very convenient solution to the conversion problem: 360 machine

(Continued on Page 4).

Grosch Bumped From NBS Post

GAITHERSBURG, Md. — Dr. H.R.J. Grosch has been removed from his post as the director of the Center for Computer Sciences and Technology at the National Bureau of Standards.

Grosch told the press Friday that he would accept a position as a research fellow within the bureau, and would report to the new director when one is appointed.

The transfer of assignments will be without loss of pay, said the outspoken champion of standards, who most recently discouraged the federal acquisition of IBM's System/3 because the small company did not have communications or Asci code capabilities (CW Jan. 21).

Grosch said his successor will find "it's a tough job. There isn't much of a constituency close by." It is the consumer, the computer user, who is most interested in standards, but they're "a long way away."

(An earlier interview with Dr. Grosch appears on Page 11.)

XDS Unveils Sigma 6 For Business Users

By Frank Pisata

CW Staff Writer

IRVING, Calif. — The first computer system from XDS Inc., the XDS 360/30, specifically intended for commercial data processing offers users a system with approximately the power of the IBM 360/50, at about the price of the 360/65.

XDS, formerly SDS, has in the past concentrated on developing computer systems for the scientific and engineering-oriented users.

The Sigma 6 is a medium-size minicomputer capable of handling batch, remote hatch, on-line and time-sharing activities concurrently. XDS said that 24 concurrent time-sharing users can be serviced while the system is running batch and utility programs.

Primary hardware characteristics include an input/output processor capable of handling up to 48 channels of data concurrently. XDS said the XDS can be allowed efficient core memory, is included.

Memory Map provides for the dynamic allocation of a program into pages of 2,048 bytes in a virtual memory of 524,288

bytes. Virtual memory is stored on a head-per-track disk drive.

Byte-string decimal arithmetic including floating-point hatch, 20-bit plus sign immediate operand, 16, 32, and 64-bit signed binary integers, and short and long floating point numbers.

The floating point is compatible with the IBM 360 series. These include 4-bit decimal, 8-bit byte, 20-bit plus sign immediate operand, 16, 32, and 64-bit signed binary integers, and short and long floating point numbers.

The central processor has a dual-access memory, featuring four-way interleaving, expandable from 131K bytes (32K 4-byte words) to 524K bytes (131K words) in 16K increments. Its memory cycle time is 300 nanoseconds or 1.2 μ sec/word.

The Sigma 6 has 32 general-purpose registers. It is equipped with a multiplexer processor with 24 channels standard and optional 48 channels available optionally. Maximum data rate through the multiplexer is 700K bytes/sec.

The processor also features Power Fail Safe, Memory Protection.

(Continued on Page 2)

Displaced Programmers Hindered By Rigidity and Lack of Versatility

By Phyllis Higgins

CW West Coast Bureau

LOS ANGELES — With California reeling under the loss of nearly 100,000 aerospace jobs in the past 28 months, many directly related to the cancellation of the space shuttle program, job hunters are affected. In addition, there is the tight economy and businesses are scanning their computer budgets for reductions in personnel.

At the same time, Wall Street has tightened up financing of aerospace companies. Factions in Congress have hit this segment of the industry hard. Also, governmental support for research at both state and federal levels has been heavily affected, cutting into computer projects.

For the first time, programmers, many of them former employees with what had been considered solid job security organizations, are going through the totally new experience of looking for jobs.

As an indication of the current market, James K. Gorham of the California State Colleges said that a recent opening for a DPM manager at one of their centers, at a salary of \$14,000 a year, brought 175 applicants and not one of these was Ph.D.s. Only six applicants were expected.

Help for Programmer

The Los Angeles Chapter of the Association for

Computing Machinery is scheduling a panel discussion for its June 3 meeting in order to help the displaced programmer. Roger Mills, head of training at TRW, will moderate the session.

In an informal discussion, he scored the resistance of programmers to learning new languages or new approaches.

"A Fortran IV programmer is a Fortran IV programmer and you can't lead him to anything else," he said.

"Further, he gets hung up on one type of application."

This rigidity of job qualifications was considered by the panel members as a serious handicap to job hunting.

Dr. Robert Gordon of the University of California at Irvine said that he knew of no aerospace programmer who was laid off and came back to the university for continuing education. A reason suggested was family financial obligations and the belief that he would be able to find other jobs.

Gordon said that he believes the displaced programmers will come in with samples of work he had done. "All the others came in with nothing written but with assurances that they could do anything," he said. It was his contention that programmers don't know how to apply to a job.

(Continued on Page 4)

ACM 'Unconventional Convention' To Exclude Commercial Exhibits

By Drake Lundell

CW New York Bureau

NEW YORK — The 1970 annual conference of the Association for Computing Machinery (ACM) will definitely live up to its planner's billing as the "unconventional convention."

In keeping with this "unconventional" theme, the planners of the show have week banned commercial exhibits and announced that the exhibit space reserved in the convention hall would be used for exhibits demonstrating aspects of the role of computers in everyday life and in improving the human condition.

The show, scheduled for Sept. 1-3 at the New York Hilton, will

be based around the theme "Computing Meets the Challenge of Your Future" and promises to be one of the first attempts on the part of the computer industry to make a conscious effort to reach the general public.

The exhibit committee, headed by Walter M. Carlson of IBM, has invited industrial firms and non-profit organizations to nominate educational exhibits for the show. The exhibit committee will choose the exhibits that it feels best show the importance and role of the computer in everyday life.

"Affect Our Lives"

"There will be no charge," the

group said, "for organizations

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Programmers Objectively

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Computerworld

SALES Corner

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(Continued from page 1)
ition, Direct/Indirect Addressing,
Full Context Switching and
Single Instruction Format.

Software

Three operating systems will be
available with the Sigma 6,
which XDS says is software-
compatible with the Sigma 5.
These include the Batch Processing
Monitor (BPM), the Batch
Time-Sharing Monitor (BTM),
and the Universal Time-Sharing
System (UTS).

The BPM, Processing Monitor
permits multiprogrammed batch
operation simultaneously with
buffered peripheral processing
(symbionts) and on-line terminal
operations. BTM allows concurrent
batch and time-sharing for up
to 16 users. UTS permits activities
including remote batch are available
under this monitor.

Universal Time-Sharing, the
most powerful of the operating
systems, permits expanded
batch, time-sharing, and remote
operations. This system permits
multiple programs to be stored
in memory simultaneously.

Language processors oriented
toward the commercial user will
be available with the Sigma 6.
Included is XDS Cobol 65,
which has some of the features
of Cobol 68. It is said by XDS to
have a high degree of compatibility.

Compatibility with available IBM Cobol
compilers.

Also available are Fortran IV-H
and XDS Fortran IV compilers.
The IV-H compiler is interactive,
and reportedly compatible with
IBM's Fortran IV. Described with
Fortran IV-H is a subset of XDS' own
subset of IV-H. Both Fortran
compilers have been implemented
with real-time extensions.

Symbol and Meta-Symbol are
the two symbolic languages
provided. Symbol provides
symbolic address referencing,
automatic address generation
and literal referencing. Meta-
Symbol is a high-level two-pass
assembler that permits testing of
parameters and conditions of
variable code.

XDS claims a 1400 series simulator,
providing program conversion
capabilities from IBM 1400
series equipment, and a sort/
merge package are available.

Several applications programs
have been announced by XDS.
The Data Management System is
operated under Cobol, Fortran
and Meta-Symbol and permits
data to be described, stored,
structured, maintained and re-
trieved from a data base.

The Management Applications
Package provides four processors

for file creation and maintenance,
data retrieval and report
generation.

The Functional Mathematical
Programming System, a new pro-
gramming package, allows users
to adjust parameters, interrogate
results, and alter sequence of
operations under study.

Simulation Language is de-
signed for digital or hybrid simu-
lation problems.

Peripherals

A variety of peripheral equip-
ment is available with the Sigma 6.
Removable pack disk drives
with a capacity of 49 and 55
million bytes are offered. One
configuration can accommodate up
to four drives of any combination
of the two models. Fixed
head-per-track disks with capacities
of 3 and 6.2 million bytes
are available.

Magnetic tape drives using 7-
and 9-track formats can be used
with the system. The 9-track
models have a data rate of 60K
and 120K byte/sec. A 7-track
drive with a data rate of 21K
char/sec can also be used.

XDS is making available the
NCR Crom magnetic card unit.
Three Crans can be attached to one
a controller, two on-line and one

as a spare.

Using these devices, 793 mil-
lion bytes of data can be avail-
able on-line per controller.
According to XDS, 20 terminals can
be connected to the communica-
tions subsystem of the Sigma 6.
XDS 7550 and 7555 video ter-
minals can also be used. The
XDS 7670 (Univac DCT-2000)
remote batch terminal can also
be used as a remote terminal.
This device is equipped with a
200 card/min reader, a 75 card/
min punch and a 250 line/min
printer.

In addition, XDS has an-
nounced a variety of card read-
ers, punches, and line printers
for the Sigma 6.

According to XDS, a Sigma 6
will lease for \$12,000 to
\$18,000 per month depending on
configuration. A typical configura-
tion with 131K of core memory,
100 million bytes of disk storage,
400 card/min reader, 200
line/min printer, two 60K
byte/sec tape units, and an I/O
processor will lease for \$13,485
including maintenance and sell
for \$70,000.

The Sigma 6 and its supporting
software are scheduled for deliv-
ery to customers in the fourth
quarter of 1970.

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Model Features	XDS Sigma 6	IBM System 360/50	RCA Spectra 70/55	Honeywell Series 200 3200
Cycle Time	300 nsec/byte	250 nsec/byte	210 nsec/byte	500 nsec/char
Core Storage	131K bytes	131K bytes	131K bytes	131K characters
Random Access Storage	24.5 million bytes	29 million bytes	21.8 million bytes	27.6 million characters
Card Reader (card/min)	1,500	1,000	1,436	1,050
Card Punch (card/min)	300	300	300	100-400
Printer (line/min)	1,000	1,100	1,250	950
Magnetic Tape Units	4 units @ 80K byte/sec	4 units @ 80K byte/sec	2 dual-drive units @ 80K byte/sec	4 units @ 64K char/sec
Rental	\$14,133	\$19,452	\$16,837	\$18,975

A comparison of typical configurations of the XDS Sigma 6 and three of its principal competitors in the medium-scale computer field.

University Skeptical About Job Bank

LONDON — A scheme to help
British university graduates find
jobs with the help of a computer is
being criticized by university
officials.

The idea, presently being
developed at a university in Eng-
land, plans for a computerized
data bank containing vacancies
throughout the country which
students could obtain by simply
pressing a button.

But Bernard Holloway, Man-
chester University appointments
officer, said: "I am in favor of

anything which assists students
in their search for jobs, but this
particular scheme is not going to
help very much."

According to William Brooks
of the University of Warwick, a
computerized job bank would be
useful to employers and the
jobs available to graduates.

The firm would have no informa-
tion about an individual student
and no names would be put
on the computer, he said.

Holloway disagrees with the

"In order to be genuinely useful
some kind of subjective as-
essment of the student should
be fed in as well as objective
information. But this is something
which, on principle, we could never allow," he said.

"But I suppose to have a com-
puter, coupled with a data bank
might be a useful supplement to
existing services. If employers
are willing to pay for it, who are
we to say no?" he said.

'Public Service' Columns?**'Action Line' Authors Assign Ailments to Automation**

By Edward J. Brice

*Not too bright computer.
"That old debbil - the computer - had
scrambled account numbers.
Choked-up Computer,
... coughed up from the stomach of a
ick computer.*

These are specific excuses given for recent consumer problems, and are causing concern in the computer community. The excuses were not uttered by angry customers or their lawyers. They were printed in metropolitan daily newspapers, in reply to letters or phone calls to public service columns like "Action Line."

Almost every major daily newspaper has its version of "Action Line," a feature originated by the Knight papers. The column gets a small number of the complaints followed by explanations of how the problems arose and what's being done about them.

The columns have a wide readership because readers love to see the establishment buckle under to the lowly consumer.

And the establishment is willing to buckle under to a published complaint, when it can't find a scapegoat.

Enter the computer.

Public Service Columns

Self-proclaimed public servants may be the worst enemy of the computer, if they resort to explaining things in the following taken from a Philadelphia *Inquirer*:

"Not too bright computer. Letters you attached to tax statements each year after 1967 return ended up in basket. Seem the brain only reads tax forms, not letters..."

The problem is accurately stated - a computer does not read letters. The real cause, although present, is hidden: a human being did not read the letters either.

'A Week Doesn't Go By'

A spokesman for Mrs. Virginia Knauer, the President's consumer adviser, recently told *CW* that "a week doesn't go by that we don't see an 'Action Line' problem depicting computer troubles."

He was referring to troubles consumers often have in correcting computerized bills (*CW*, March 11).

The problem is of increasing concern to the President's consumer committee, and these columns seldom help explain the cause to the frustrated recipients of erroneous bills.

Another Philadelphia paper, the *Bulletin*, publishes "Mr. Fixit's Action Line."

Mr. Fixit recently explained that a stock office computer was "haywire," but a phone call to the broker's office solved the problem. A consumer had waited six months for over \$2,000, and a "haywire computer" was the only explanation that Mr. Fixit could offer.

A Computer Sins Again

But even when names are used, the explanations remain nameless and abstract. A Long Island paper pointed its finger at UniCard's customer relations department, which passed the buck to "that old debbil - the computer," which had "scrambled account numbers." The headline over the letter proclaimed, "A Computer Sins Again."

A New Jersey version in the Woodbridge *News Tribune* explained a delay in jury pay as caused by "difficulties with the computer." That was supposed to calm down the employee with a family to support, because the column did hasten the check.

But the employee will always remember the cause of his problem . . . "difficulties with the computer."

The column is called "ZIP" in the

'Useful Computer': Customer

Consumers presume computer errors were correspondence to company officials prove fruitless.

This fact was borne out last month in a letter to the "Action Line" in the *Miami Herald*.

The consumer complained of an oil company's failure to correct dunning notices for oil purchases. He sent on the credit card at a motel in Georgia.

The complaint ended, "Perhaps a word or two from Action Line will help unmask their computer."

The cause of the problem however: "... a good portion of your correspondence went to the motel, and not to [the oil company]."

Yonkers *Herald Statesman*, and a three-month delay in a gun order was explained this way: "Your order was misread by the machine."

The solution was brought by "ZIP's

letter to the president" of the company, someone for whom I am sure CW readers have heard of before. Other publications have long advocated this.

In all of these cases, the stated objective is achieved: solution of the individual problem.

However, an explanation of the cause is always given, and it leaves the individual and all the readers in the dark, when a tax refund is reported as "coughed up from the stomach of a sick computer."

This One Is Accurate

The Seattle *Times* calls its problem solver the "Troubleshooter," and the

rest of months and reams of action line

euphemisms, Dick Moody, the "Troubleshooter," tells it like it is.

A "disgusted" writer said: "How frustrating computer mixups can be..."

But Moody's column that day was headed "Computer Blamed for Employee's Errs," and that tells it all.

Moody went one step further, explaining that the company involved had reminded the employee who had solved the problem, "it is not enough to act upon a customer's letter, but the customer must be notified why action was taken."

It is clear that company's top manager apologized to the consumer, then applauded Moody's efforts in channelling problems to the right office and "bringing to the attention of . . . managements the shortcomings in their operations which require corrective action."

And telling it like it is.

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Survey Shows SJCC Exhibits Major Attraction

By Edward J. Bride

CW Staff Writer

ATLANTA, Ga., May 13.—If you're an average computer user and attended the Spring Joint Computer Conference, you came from somewhere between New York and Washington, and you would not attend the next one if the exhibit hall was there.

The part of the profile rendered by over 200 questionnaires, or about 3% of the full-registration (paid) attendees of the SJCC, held here two weeks ago.

Some exhibitors did answer the questionnaire, about 10% of the total, but most of them fell within the parameters of the "average" or typical SJCC attendee. Some exhibitors, in fact, were paid registrants who attended the technical sessions and panel discussions.

The CW survey showed that the average registrant attended primarily for the exhibits, despite Alips' often-stated policy that the conferences are "scientific and educational" meetings, rather than sales exhibitions.

An Alips official suggested that this purpose was one reason that exhibitors are discouraged from displaying price comparisons, a change suggested by many attendees.

The typical attendee planned to visit the various technical sessions, and thought that the presentations were "adequate." Conference "Proceedings" divided the typical registrants. Some thought the "Proceedings" should be withheld until scripts of the panel discussions could be included.

Others thought that advance registration should qualify them for advance copies of the technical papers, which could then be studied before the conference actually began.

The average paid attendee did register in advance for the con-

Another prominent suggestion was that product groupings should be affected, such as: OEM or end-user systems, products or services.

One registrant thought that a significant portion of the floor space should be devoted to social implications. Another thought that a significant part of every technical session should be devoted to the "social aspects" of the technology being discussed."

Training for Speakers

Of the respondents unhappy with technical sessions, most thought that the readers of papers were not prepared for a public reading (one cited a "secondary reader"). Another commented that, in an exhibition hall containing \$100 million of equipment, the sound systems were "uniformly bad."

A complaint from the past returned: not enough time for informal exhibits. One attendee even stated that there was not enough time for just the sessions.

He stated that, on Thursday morning, there were three concurrent sessions which he wished to attend.

Another attendee suggested that the technical sessions be recorded on video tape, then run continuously on monitors in small booths.

This, he felt, would allow speakers to tour exhibits while also continuing to address to visit concurrent sessions.

This suggestion, however, would not provide the dialogue which was strongly suggested by some registrants. One respondent called the panel sessions "long, boring and uninteresting." He said that half the time should be allotted for dialogue from the floor.

The typical attendee was inconvenienced for one reason or another, at some time during the week.

One called for more water fountains. Others mentioned the need for a paging system and a message center similar to that used at the FJCC.

A New IBM Family This Summer?

(Continued from Page 1)

languages and Assembly Language are expected to be entirely different from the NS languages, but it would be possible to alter the microscopic programming to duplicate exactly the hardware logic of any 360, any 360/30, or any 360/65, if desired.

360 programs could run in real compatibility for as long as needed, and run efficiently.

Cobol, Fortran, PL/I, and other high-level languages are expected to be completely upgradable to the NS machines. The programs can simply be recompiled when the user wants to use the more advanced capabilities of the NS in its native machine language mode. IBM appears to have learned from the mistakes made in developing the System/360. With variable micrologic, IBM is offering its users a much more reliable and effective means of going from one system to another.

Communications Integral to CP

Again using variable micrologic, IBM has built communications processing directly into the central processor eliminating the multiplexers and line controllers for the 360.

With the 50,000 bit/sec transmission speeds for the System/3 communications option, and with the high transmission speeds possible with the 2770 and 2780 line controllers, IBM is planning drastic changes in its communications architecture.

Moving message control and line control into the CP provides faster response time and much more user control.

This microscopic communication has been successfully demon-

strated within the last few weeks by several minicomputer firms.

Hardware Performance

Several upward-compatible versions of NS are expected to be announced. The smallest, the NS-0, offers memories from 32K to 128K, while the largest discusses the 553, which is expected to provide memory sizes up to 2,048K (two megabytes).

These are two-page memories, with the listed memory as ferrite cores, and an NS MOS buffer memory that operates an order of magnitude faster than the core. Instructions and data are loaded into memory in parallel. The machine can run at the higher speed of the buffer, not at core speed.

Memory will be packaged in more convenient sizes. Instead of requiring the user to buy all of the memory when he wants to upgrade it, the memory comes in several sizes: 32K, 48K, 80K, 96K, 128K, 192K, 256K, 384K, 512K, 768K, 1,024K, 1,536K, and 2,048K.

The NS machines will be compatible with the 360/30 and 360/65. The price range from about \$10,000/mo. (128K) to about \$20,000/mo. (512K). Ratios provided for both scientific and commercial work describe the relative performance on the same mix of jobs.

NS-0

The NS-0 performs at 0.7 times the 360/30 for commercial processing and 0.8 times the 360/60 for scientific processing. An optional accelerator is planned for these numbers, 0.8 and 1.4, respectively.

The NS-0 will rent from about \$2,300/mo. (32K) to

about \$10,350/mo. (128K).

NS-1

Commercial performance for the NS-1 is expected to be 1.9 times that of the 360/30, and scientific processing to be 1.4 times the 360/60. An optional accelerator raises those numbers to 2.4 for commercial and 3.0 for scientific processing. The NS-1 is expected to rent from about \$3,750/mo. (32K) to about \$21,700/mo. (512K).

NS-2

The NS-2 will have a commercial performance ratio of 3.5 times that of the 360/30/50. Scientific processing is expected to be about 3.8 times the 360/60. No accelerator features are scheduled to be available for these larger machines. The NS-2 will rent from about \$10,350/mo. (128K) to about \$41,850/mo. (512K.).

NS-2'

Commercial and scientific performance for the NS-2' (two-prime) is expected to be about 5 times that of the 360/50. The NS-2' will expect to rent for \$10,350/mo. (256K) to about \$44,850/mo. (1,024K.).

Because there are several differences in the standard equipment on each processor in the family, it is not possible to directly compare NS machines among themselves, at present.

28,715 Attended

Latest figures for SJCC reflect nearly 29,000 attendees, considerably more than last week's Alips estimate in CW.

Totals which are not audited and which are reportedly expected to increase are as follows:

Total paid	2,501
Exhibit guests	14,034
Advertisers	5,600
Misc (press, VIPs, etc)	1,580
Total	28,715

ference and for hotel accommodations, although nearly 40% did not receive advance registration materials in time to take advantage of this innovation.

Booth Personnel Competent

The average attendee was quite sure that company representatives in various booths were able to answer questions. He also thought that there was a sufficient number of company representatives, and a sufficient amount of space surrounding the exhibits.

Those exhibitors who replied agreed with these thoughts, although exhibitor and patron alike stated that booth-numbering signs and layout diagrams were needed near the exhibit areas.

Tired Feet!

The common complaint of "tired feet" occurred in many service firms. Several conferees desired more chairs to make their excursions more endurable.

The average attendee also had some traffic suggestions. He thought perhaps the aisles should be one-way only, with intersecting aisles to reverse directions.

Jobless Programmers Called Inflexible

(Continued from Page 1)

T.L. "Kelly" Skwinski of International Executive Search said that computer engineers and

logic designers are still in high demand, but a Fortune IV programmer is difficult to place. He said that a compiler writer, if he

ACM 'Unconventional Convention' To Exclude Commercial Exhibits

(Continued from Page 1)

desiring to present demonstrations of computer applications, while most directly affect our business."

In recent years, attendance has been falling off at the ACM national conferences, which might have made some potential exhibitors shy off. The largest conclave for the organization was in Washington in 1967 with 1,600 attendees. Attendance figures in 1968 and 1969 were both lower than the Washington figure.

The organizers of this year's show expect at least 5,000 to attend the planned sessions and exhibits, but hope for a large turnout from the general public for the exhibit hall.

knows Jovial and Algol, can make \$20,000 to \$25,000.

A scientific programmer with data bank experience is also in a good position, he said.

The problem, as Skwinski put it, is the salary differential. He said that the man making \$10,000 a year is looking for the "two-headed man" who has an MBA degree and computer know-how, the patent expert with computer knowledge, etc.

Guy Dobbs, vice-president of Xerox Computer Services and former chairman of the ACM Systems Inst., will discuss at the meeting the problem of the man who decides that now is the time for him to go into business for himself.

Although Dobbs feels the money climate right now all but prohibits this possibility, he has no doubt that the individual entrepreneur has more chance of being hired by industry than the aerospace programmer who has been in a narrow field.



THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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'Clets' Links NCIC, State Law Enforcement Agencies

SACRAMENTO, Calif. — This state has just dedicated what is claimed to be the nation's largest state-wide computerized law enforcement information retrieval and data transmission system.

Designed to identify wanted

persons or property, and also to prevent wrongful detention of innocent parties, the system will be tied to the National Crime Information Center (NCIC) maintained by the FBI in Washington.

The California Law Enforcement Telecommunications System (Clets) replaced the State Teletypewriter System which was established in 1931.

The manual system handled more than three million messages a year.

The computerized system will use four RCA Spectra 70/46 units, two each in Los Angeles and Sacramento. The computers are expected to direct a daily flow of 35,000 messages over a special 20,000 mile transmission-line network with over 1,000 terminals.

Dedicated last Tuesday by Gov. Ronald Reagan, the \$5-million system links more than 450 state and law enforcement agencies to computerized crime files here and in Washington.

The high-speed message-switching system allows any urban or rural law enforcement agency to obtain instant information on wanted persons, stolen and lost property, firearms, and stolen vehicles.

Additionally, an agency can broadcast a message to all other agencies within the state, or to combinations of agencies.

Necessary to Enforce Law
Attorney General Thomas C.

Lynch said that the network is "essential to law enforcement." Lynch cited California's large and fast-growing population, plus the increasing mobility of criminals.

He said: "Only a fantastically high-speed communications network can handle the flow of automated information which is needed by today's police."

Several weeks ago, four California policemen were killed in a gun battle which followed the routine questioning of some restaurant patrons.

Some legislators have said that, if this system had been installed then, the five of these patrons who were involved in the shooting would have been identified as dangerous criminals before they had a chance to pick their

background and surprise police. Clets is a cooperative effort of the California Department of Justice and local law enforcement agencies.

The hardware, the personnel at the two switches, and the backbone circuitry with one terminal point in each county are provided by the state. The local agencies have provided the circuitry and equipment which links them to their county terminal point.

Informatics Inc. of Sherman Oaks provided the software. Computer Deductions Inc. of New York was retained as a member of the implementation team.

The California telephone industry assembled the transmission network.



California's Criminal Information Network

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NOTE: NUMBER SPECIFY PART NUMBER, PART NAME AND INCLUDE
SIZE, CLASS, CODE AND SERIAL NUMBER STAMPED ON DATA PLATE.

R A I N B O D Y P A R T S

	PART NAME	MATERIAL	REFERENCE NUMBERS
			82 83 84
39	NUT	STEEL	26582 26582 26582
40	NUT	STEEL	23194 23194 23194
41	STOPPING BOX STUD	COLD ROLLED ST	22950 22950 22950
42	STOPPING BOX BOLT	STEEL	44867 44867 44867
43	CLAMP	STAINLESS STEEL	22948 22948 22948
44	CAP SCREW	STEEL	90080 90080 90080
45	STEM PACKING SET COMPLETE	MOLDED RINGS	23319 23319 23319
47	NUT	STEEL	36760 36760 36770
48	BONNET BRONZE VALVE	CAST BRONZE	28733 29509 29499
49	BONNET IRON VALVE	CAST IRON	28732 29508 29498
50	BONNET GASKET	SHEET PACKING	18527 49654 49655
50	BOLT BRONZE VALVE	STEEL	40210 44880 36530
50	BOLT IRON VALVE	STEEL	28945 33754 36530
51	MAIN BODY SCREED IRON VALVE	CAST BRONZE	47071
51	MAIN BODY SCREED BRONZE VALVE	CAST IRON	47070
51	MAIN BODY FIG 125 LB IRON VALVE	CAST IRON	47072 36864 36831
51	MAIN BODY FIG 250 LB IRON VALVE	CAST IRON	47073 36865 36830
51	MAIN BODY 150 LB BRONZE VALVE	CAST BRONZE	47074 42898 42900
51	MAIN BODY FIG 300 LB BRONZE VALVE	CAST BRONZE	47075 42899 42910
52	BOTTOM CAP GASKET	SHEET PACKING	18334
53	CAP SCREW BOTTOM CAP	STEEL	91300
53	BOLT BOTTOM CAP	STEEL	
53	NUT BOTTOM CAP	STEEL	
56	INNER VALVE Y-PORT	STAINLESS STEEL	31242 37455 33374
56	INNER VALVE QUICK OPENING	STAINLESS STEEL	31243 37456 33357
57	SEAT RING V-PORT AND QUICK OPENING	STAINLESS STEEL	29859 31231 31232
58	BOTTOM CAP 150 LB BRONZE VALVE	CAST BRONZE	15744
58	BOTTOM CAP 300 LB BRONZE VALVE	CAST BRONZE	15744
58	BOTTOM CAP 125 LB IRON VALVE	CAST IRON	16343
58	BOTTOM CAP 250 LB IRON VALVE	CAST IRON	16343
59	INNER VALVE GUIDE BUSHING	STAINLESS STEEL	27042 27043 27043
56	INNER VALVE V-PORT	STAINLESS STEEL	35797 44262 44237
56	INNER VALVE QUICK OPENING	STAINLESS STEEL	40453 44263 44275
57	SEAT RING V-PORT AND QUICK OPENING	STAINLESS STEEL	35796 36523 35517
58	BOTTOM CAP 150 LB BRONZE VALVE	CAST BRONZE	15744
58	BOTTOM CAP 300 LB BRONZE VALVE	CAST BRONZE	15744
58	BOTTOM CAP 125 LB IRON VALVE	CAST IRON	16343
58	BOTTOM CAP 250 LB IRON VALVE	CAST IRON	16343
59	INNER VALVE GUIDE BUSHING	STAINLESS STEEL	27042 27043 27043
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MAIN BODY PARTS

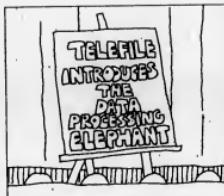
When ordering parts, please specify part number, part name and
Indicate size, class, body and valve number stamped on data plate.

Part No.	Part Name	Material	Reference Numbers
No. 2	No. 3	No. 4	
33 Nut	Steel	26002	26003
40 Nut	Steel	25194	25195
41 Stuffing box stud	Cold rolled steel	22900	22900
42 Stuffing box bolt	Steel	44067	44067
43 Cleat	Stainless Steel	22945	22945
44 Cap screw	Steel	90000	90000
45 Seat packing set complete	Molded rings	22915	22915
47 Nut	Steel	90700	90700
48 Bonnet bronze valve	Cast bronze	26733	26733
49 Bonnet iron valve	Cast iron	26732	26732
45 Bonnet gasket	Sheet packing	18627	44064
50 Bolt bronze valve	Steel	46110	46000
50 Bolt iron valve	Steel	36000	37785
51 Main body screwed bronze valve	Cast bronze	47071	—
51 Main body screwed iron valve	Cast iron	47070	—
51 Main body lg 125 lb. iron valve	Cast iron	47072	36004
51 Main body lg 250 lb. iron valve	Cast iron	47073	36005
51 Main body lg 150 lb. bronze valve	Cast bronze	47074	42000
51 Main body lg 300 lb. bronze valve	Cast bronze	47075	42000
52 Bottom cap gasket	Sheet packing	18334	—
53 Cap screw bottom cap	Steel	91200	—
53 Bolt bottom cap	Steel	—	—
53 Nut bottom cap	Steel	—	—
54 Inner valve v-port	Stainless steel	31242	37405
54 Inner valve quick opening	Stainless steel	31242	37405
57 Seat ring v-port and quick opening	Stainless steel	26000	31251
58 Bottom cap 150 lb. bronze valve	Cast bronze	18746	—
58 Bottom cap 300 lb. bronze valve	Cast bronze	18746	—
58 Bottom cap 125 lb. iron valve	Cast iron	16345	—
58 Bottom cap 250 lb. iron valve	Cast iron	16345	—
59 Inner valve guide bushing	Stainless steel	27042	27045
59 Inner valve v-port	Stainless steel	36797	44200
59 Inner valve quick opening	Stainless steel	40460	44205
57 Seat ring v-port and quick opening	Stainless steel	36797	44205
56 Bottom cap 150 lb. bronze valve	Cast bronze	18744	—
58 Bottom cap 300 lb. bronze valve	Cast bronze	18744	—
58 Bottom cap 125 lb. iron valve	Cast iron	16345	—
58 Bottom cap 250 lb. iron valve	Cast iron	16345	—
59 Inner valve guide bushing	Stainless steel	27042	27045
59 Inner valve v-port	Stainless steel	36797	37711

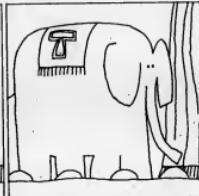
PARTS MANUAL

Page 28

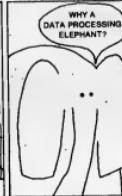
The Data Processing Elephant



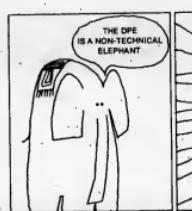
The Data Processing Elephant, or "DPE" as we call it, is a unique file management computer.



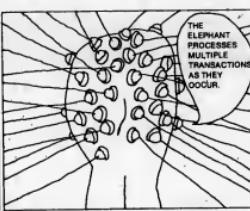
By itself the DPE can manage all your files or it can complement your present EDI system.



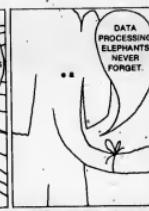
WHY A
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ELEPHANT?



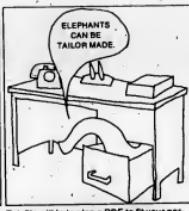
The DPE's language is a simple standard COBOL. The common business language. So you don't have to be a computer expert to use the DPE.



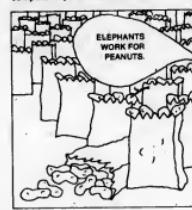
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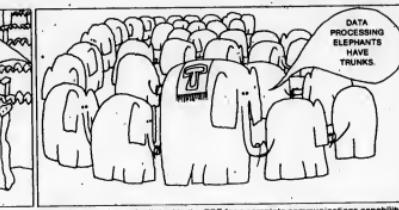
The DPE can let its handler on any information you need right away. Because the DPE features random access and no sorting.



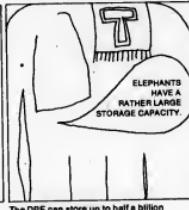
Telefile will help plan a DPE to fit your particular company's needs for data storage capacity and communication facilities.



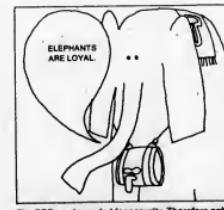
Many, many, many peanuts.



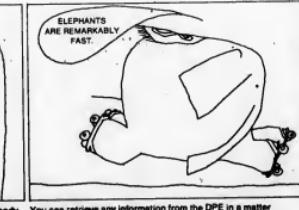
Up to 56 terminals can be linked to the DPE for a complete communications capability.



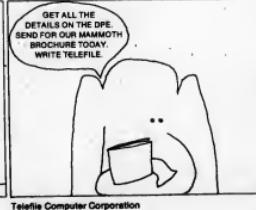
The DPE can store up to half a billion characters of information.



The DPE can be coded for security. Therefore nobody can get access to any part of the elephant's memory unless he's entitled to it.



You can retrieve any information from the DPE in a matter of seconds.



Telefile Computer Corporation
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Telefile

Editorials

Road Maps Needed

It's not that the joint computer conference shows are too big — it's just that you can't find anything easily. Sometimes you can't even find your way back to where you have been before.

There are several good arguments why computer manufacturers shouldn't be grouped by type of product. To keep this editorial short, let's accept the arguments as valid.

But there is no reason why people shouldn't be given enough information to enable them to find — quickly — what they are interested in seeing.

- Booth numbers should be prominently displayed.
- Large maps of the exhibit hall, with company names and booth numbers shown in their respective locations, should be placed at all entrances, lounges, and other public areas. The should be marked with a red "you are here" star.
- Aids should provide, or arrange to have provided, a booklet that not only lists exhibitors alphabetically by name and by product type, but also by product type in sequential booth order. This would make it easy for a visitor to stop by every booth displaying, say, a minicomputer without taking unnecessary steps.

In addition to these aids, traffic movement should be improved by eliminating some of the lateral aisles. The space saved could be used to widen the remaining aisles.

A public address system should be used to make brief announcements when conference events are about to begin. Visitors become involved in the exhibits and often don't realize what time it is.

Since 74% of the attendees polled by Computerworld said they were attending primarily for the exhibits and 65% said they wouldn't come to the conference if there were no exhibits, the technical sessions and the exhibit hours should be staggered. If the technical sessions are held between 9 a.m. and 4 p.m., the exhibits should be open, say, from 1 p.m. to 8 p.m. This would allow people to attend both rather than having to choose one over the other.

Aips should stop kidding itself that the exhibits are still a minor attraction requiring only a few minutes time to see.

Inside, Not Outside

Last week's editorial on the security of computer centers stated that they should be locked from the outside. This was a typographical error. Centers should be locked from the inside, since a guard on the outside is vulnerable to having the key taken from him by force.



'Wish I Could Take Time off to Play'

Letters to the Editor

Good Documentation Key

To Correcting Mistakes

Dr. Harvey Gellman (CW, April 15, "Computerized Business Systems Called Futile, Slovenly") undoubtedly is correct in his analysis of business systems software. However, is there something more behind the "inability of computerized customer billing systems to correct simple mistakes?"

Past experience with neophytes in computer systems software has often shown that the user has not been made to understand the limitations of a computer. He has not been adequately informed on the manner in which data must be prepared for processing. Thus, he will do strange things to the data and expect the computer both to understand what he is doing and to make the same adjustments a person might make.

The inaccuracy may therefore not only in the software. Properly informed and educated users can overcome the disadvantages of poorly planned and implemented program in most cases, if given a fair deal in the documentation of the poor program. Granted there are some factors introduced by poor planning and implementation that good documentation cannot overcome, but most of these factors can at best be alleviated by proper explanation directed to the user's level of understanding.

It could well be the programmer's documentation for using his software was as slovenly in planning and audience consideration as his implementation of the program.

S.E. Emhoff
President

Technicon Corp.
Phoenix, Ariz.

Printer Terminal Faster Than Reported by CW

In your April 1 issue, page 25, there is a story of a printer which operates six times faster than Teletype. The article makes reference to our Digitronics Printer Terminal Model D401 and states that it has a rated speed of 30 characters per second.

Our printer terminals operate at speeds significantly higher than the figure you mentioned. Limiting factors are the transmission rate and, since they are line printers, the number of characters in a line. Assuming an average 80-character line, then using a 202 Dataphone, the effective rate would be 150 char/sec. If a 201 or equivalent subset operating at 2,400 bit/sec is used, then the

effective print rate would be 250 char/sec. These rates hold for both our Dial-O-Verifier Model 401 and 4021 printers.

Morton Siegelbaum
Vice-President

Digitronics Corp.
Albertson, N.Y.

Industry Old-Timers Long For the Old 1401 Days

Re: Your article "Programmers Hit at Symposia" (CW, April 15).

I am certain that many "Senior Members of the Industry" are in complete agreement with Dr. Hamming. They find themselves longing for the good old 1401 days, with even more empathy with those who are waiting uneasily for Detroit to produce brand new 1949 Chevies — fast enough for any same driver, simply maintained, cheaply operated.

Martin McDow

San Francisco

Computerized Gun Director Creates Output Hazard

Your editorial "Garbage In, Lawsuits Out" [April 22] refers to data processing people's refusal to accept responsibility for controlling input and output to computers. You say, "The damage caused by a system that makes inadequate provisions for proper handling of potentially harmful output . . . will result in a . . . victim (who) will not be easily placated."

On page 9 of the same issue, I read this headline: "Computer-in-the-Field Increases Accuracy of American Gunners," referring to artillery firing, and datelined Saigon (where else?).

Another editorial please . . . ?

Dick Koehler

Milwaukee, Wis.

Actually there is tight output control over the gun director. Spotters watch where the rounds go and order immediate adjustments to correct errors. Ed.

Computerworld welcomes comments from its readers. Preference will be given to letters of 250 words or less. Computerworld reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, Computerworld, 797 Washington Street, Newton, Mass. 02160.

Has Dr. Grosch Now Set a Limit on Programming?

It is a true and unfortunate fact that when programs are being written, the chances are that there are some bugs in them so that when they first go into operation — some unexpected — and often distressful — results occur. Not unnaturally, these start-up problems are often swept under the rug, and concealed as far as possible.

Now, one of the major scientists in the field has emerged under the rug and is suggesting that not only does this type of concealment hide genuine start-up problems — but that it also hides the symptoms of a fundamental, if unrecognized, limitation in the capacity of present-day technology in the use of computers.

And, he says, that many Management Information Systems — the glamor programs that are being pushed to hard nowadays — are beyond the limit!

Which adds up to a real kettle of fish for the industry, and one which will probably be quietly pushed under the rug and forgotten about even though the scientist concerned, Dr. Herbert R.J. Grosch of the National Bureau of Standards, has both done his

ly within the state of the art. His basic for saying this is based upon consideration of the various reservation systems; and a comparison of the demand which these place upon the systems designers as compared

The Taylor Report

By Alan Taylor



with the demands necessarily placed upon them by Management Information Systems, and by Intelligence Systems.

Marginal Operability

The argument notes that with the rate of change of technology — that is a basic part of our environment — airline reservation systems have been factored out of the limit. Their difficulty is that the problem keeps changing, even though everyone concerned is trying to make it still.

— Anyone who travels much, and uses either these systems, or their first cousin such as rental systems, hotel reservation systems, etc., will know what he means. These areas are still only marginally operable. Problems in behavior, such as changing patterns of no-shows, caused system failures at this year's Spring

Joint, just like they did at last year's and at the 1969 DPMA Montreal meetings also. Currently there is just no solution in sight. They do work — but you can't really rely on them.

Using these facts as a springboard, Grosch then considers just what the real demands would be placed upon the system designers by Management Information Systems.

The difference between an information system and a Management Information System is that in the Management Information System the real need is the somewhat intangible factor resulting from management being able to give better decisions as a result of the use of the system. The payoff is the additional profit made by being able to improve the decision-making processes.

The basic demand that a Management Information System has on its designer is that it must be able to provide the data that a manager uses to make better decisions.

Which is one thing we don't know how to do — and which, even if we did know, changes so fast that we can't keep up with it. Even the best computer workers think differently, and probably thinks differently, before and after a coffee break (ask his secretary).

Evaluating decisions in a real-world situation is simply not yet a science. Even people who are known to be good decision makers cannot help the situation develop much, because they totally disagree about what data they should have, and even about what data they use.

So how can Management Information Systems designers know that they are improving the quality of the decision, Grosch asks? And, if they don't know, how can they claim that their expand-

ive set-up, with its terminals and supporting computers and programming teams is a Management Information System?

He particularly emphasizes that even the data which the system designer receives from management is improving his decisions. It may be helping him more in his keep-up-with-Jones games, and enabling him to put more figures into any those keeping-my-nose-clean memo that large corporations often seem to require as part of the price of survival in the executive jungle.

The interesting point is that he is right. Managerial praise, and managerial guidance is no statement of managerial need, or management improvement. And managerial need changes so fast that we could not keep up with it economically anyway, not with our current programming techniques.

So it looks as if Grosch's Law, like Grosch's Law before it, has very considerable evidence in its favor and that users may well

benefit by checking out their programs — particularly their MIS ones, to see if they are really possible or if they are simply an expensive gamble.

(Of course, they may not just be checking out information systems, in which case they may be within the limit technically — but then the economic justification may need careful review to see that the missing data not carried over in the dollars and cents statement.)

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Is This His Limit?

While in his speeches Dr. Grosch has not put his limit into words, it looks as though he is telling us that the kind of full program must have all-round cooperation and unambiguous definition before it can be written with today's technology — and some program types (like a true MIS!) cannot get there."

homework before coming to the conclusions, and has, in the proper scientific tradition, communicated his results as comprehensively as anyone in our industry can.

Three Program Types

Grosch breaks down programs into three categories:

1. Straight-line programs, such as payroll, where the process of going from the input to the output is well understood, and the resulting meaning of the output is known. These, he says, can be written, even though in 1954 there were some serious doubts about this.

2. Cooperative, looped, programs — such as airline reservation systems, where the process of going from the input to the output is not really well understood, and may involve some feed-back from the output into the program, but where the real meaning of the output — once obtained correctly — is known, and everyone is cooperating to reach the same goals.

These, he says, are just barely possible in the current state of the art.

3. Uncooperative looped programs — such as Management Information Systems, and Command and Control Intelligence Systems — where either different parts of the problem have fundamentally different aims, or where the meaning of the output is not clearly known.

These, he says, are not current-

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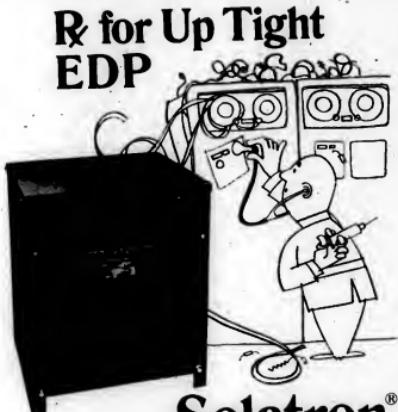
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Systems Analysts-Part II

What He Needs to Succeed

By Milton C. Spett

Special to Computerworld

Many companies simply "promote" successful programmers into systems work. In most cases these successful programmers fail as systems analysts because they lack one, or more, of the following abilities which are required for successful business systems analysis, as defined in the previous article.

Frustration tolerance. The systems analyst must endure frequent sights, occasions, inputs and all the delays and red tape of a large bureaucracy. He must obtain information and cooperation from people who have other jobs to do and whose very jobs may be threatened by the systems analyst's recommendations.

Many negative attitudes will be encountered and must be counteracted by the systems analyst. The kind of person who throws up his hands in despair after he meets the first obstacle, or the second, or the tenth, may be a successful programmer, but he will never be a successful systems analyst. The successful systems analyst must tolerate immense problems, yet always maintain his composure and constantly redouble his efforts until his final goal is achieved.

Skepticism. The systems analyst will hear statements that range from brilliant observations through mild distortions to complete lies. He will told that completely unnecessary reports are absolutely essential. He will be told that useless information would be invaluable. He will be told that a system produces five reports when seven are actually produced and needed. He must listen to all statements and determine their value, often with very little concrete evidence.

If he is told conflicting stories by two people, he is lucky because he knows that at least one of them must be wrong. But it is also possible that several people will give him identical information. He must learn the prejudices and biases of the people he is dealing with, and identify the people who know the most about each business area.

To cut through all these half truths and untruths, he must have that sixth sense that perks up at a vague statement or a remark that does not jibe with something he knows to be true. He must immediately identify those defensive feelings which cause men to distort reality to fit their subjective needs. A programmer can go to the computer manual and get the right answer 95% of the time, but to become a successful system analyst, he must develop this educated, logical attitude.

Organization. The systems analyst is usually given some vague indication that something is wrong somewhere. He must ascertain what is really wrong and then draw on disparate pieces of information to define a project. This requires organization, drive, and determination.

In effect, the systems analyst must make something out of nothing. He is given a completely unstructured situation and must produce a perfectly structured system. It appears to be quite easy to begin at the beginning, go on to the end, and then stop. Unfortunately, many people display the tendency to begin in the middle, and then go off on every tangent imaginable. While the quality of "organization" is important to the programmer, the systems analyst begins with a far less structured problem and shapes and molds it substantially before the programmer is brought in on the problem.

Politics. A large part of the systems analyst's work involves dealing with politics. He must solicit the cooperation of the user involved in developing the system, then their approval of whatever changes must be made in their operation, and finally their successful installation and running of the new system.

In each of these areas he will run into varying degrees of irrationality, that is, judgments of him, his proposals, his system which are unrelated to their true value. The systems analyst's ability to maintain the cooperation of the using department and still get them to do what they must do is largely dependent upon his political skill. The more irrational the using department, the greater the degree of political skill required. Of course if the using department is perfectly rational, no political skill at all is necessary.

The specific activities required in the political sphere include knowing when to press a new idea and when to hold back, securing the friendship of the powerful members of the using department, and presenting an image of himself that is attractive to the using department. These skills, which are equally important to the successful systems analyst, are largely irrelevant to the successful programmer.

Imagination. This is of course important to the successful programmer, but it is of supreme importance to the systems analyst. Since his job is change, he must be able to consider the entire spectrum of possible changes, without the more normal limitations of the human mind. It is frequently this very quality which allows the systems analyst to come up with a totally new solution to a problem that was previously thought to be insoluble. Two or three imaginative new concepts can be the difference between a mediocre system and a superior system.

If a systems analyst has these abilities, he will be successful, no matter how little experience he has in the specific problem assigned to him.

The intent of this article has not been to compare the importance of systems analysts and programmers. A similar article could be written describing the reasons why successful systems analysts are often mediocre programmers. The main point is that these two jobs require two different types of people and the practice of "promoting" a successful programmer into systems work is usually undesirable for both the individual and the company.

Milton C. Spett is manager of data processing for the Industrial Gas Division of the Air Reduction Co.

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Hard enough to turn the Hetra processor into the Hetra S Series data processing systems. Faster and more powerful than the small system the Original Thinkers thought of. With a greater range of peripherals.



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Scrutiny of Old Trademarks Aids Search for New

BOSTON — Before making application for a trademark, it is essential to search the Patent Office and other records to avoid infringing on the rights of others or causing confusion over a similar sounding name.

How well a preliminary search is made often determines the legal and competitive acceptance of a mark. It does little good to go to the expense of establishing a mark without first determining the likelihood of opposition.

Thomson and Thomson, a Boston-based private trademark organization, has computerized its operation so that foreign and state registrations can be added and common law rights can be checked.

Implementation of an NCR Century 100, the firm also will enable the firm to do searches in relation to suffixes and phonetic sounds. Often, attorneys requesting searches are as much interested in marks with similar suffixes and sounds as they are with those having the same prefixes.

'Exact Marks'

"The search routines," according to Francis W. Campbell, a Thomson and Thomson partner, "are designed to find exact matches between the name or similar marks for the same or related goods regardless of class, examples of the prefix, mid-syllables and suffixes involved, foreign languages and equivalents, synonyms and alphabetic, phonetic and alaphonetic sequences of letters and/or sounds."

Architects Ask Computer Advice On Glass Choice

MINNEAPOLIS — Designers of a new \$15 million airlines headquarters complex are using cost-estimating computer service by PPG Industries to help evaluate and select the best glass to resist the cold Minnesota winters.

The service is a computerized glass-conditioning program which PPG offers to customers.

Architects-engineers Quinton-Budding of Los Angeles are using the computer service to help select environmental control glass for the new two-story North Central Airlines general office building at the Minneapolis-St. Paul International Airport.

The company offers the computer service through its regional architectural representatives for buildings in the design stage. The architect reviews the details of the project with the representative, as well as the performance of the company's environmental glass products.

With the help of his consulting engineer, the architect collects the essential input data for the computer program. Included is such information as building location and orientation, total glazed and non-glazed areas, number of occupants, and building life and cost.

PPG then adds its own computer input on product performance, weather, heat flow and accounting data, plus technical data from research programs at its glass research laboratories and Penn State University.

What came out of the computer for the North Central Airlines general office building was a complete comparison for five PPG environmental control glasses.

The comparison of each glass included the estimated purchase price, size and operating costs for the heating and air-conditioning systems and long-range savings from reduced heating and cooling loads.

In selecting the glass, the architects also considered aesthetic effects in addition to cost and performance data.

With the computer, the search combinations open to the firm are restricted only by the ingenuity of the company's researchers. Instead of sifting through drawers of files, the computer sifts through the records, pinpointing references for closer investigation.

The firm is recording over 500,000 active trademarks on magnetic tape in alphabetical order by class, or goods category. Another 300,000 less active marks continue in the card files. Other means of searching records being maintained are a file of pending applications and the three million entry cross-referenced alphaphonetic search index.

The key to the new system is the master file of active trademarks, which the computer analyzes. It also guides the researcher in referencing the index cards required. When a search request is received, it contains the proposed trademark and the appropriate "goods" category. The classification is important to pin down the

mark to a particular product line. Many medicines and pharmaceuticals, for example, end in "amine," so it is just as important to search for the word "amine" as it is to list marks with similar prefixes.

The requests are referred to researchers who establish the search criteria.

The parameters are set down on a specially designed form and converted into punched cards which are read into the computer. The computer is equipped with dual spindle disk drives which permit the requests to be processed at random and sorted alphabetically according to class. In this way, the requests are arranged in the same order as the master file stored on magnetic tape.

Once sorted, the marks are automatically checked against the index. Exact duplicates, regardless of class, are noted and, based on the criteria established by the researchers, the computer pulls out other similarities.

When the matching process is comple-

ted, the computer sorts the marks into search number order and records the data on one of three magnetic tape handlers linked to the system.

The computer then prints reports of the findings. Generally, 200 to 250 possible similarities are uncovered through the computer search. But, since not all are relevant, the researcher picks out the pertinent ones and has the computer do a more exacting search.

On the basis of this last sift, the researcher checks through the card files, and usually comes up with 20 to 30 citations that will include exact marks in all fields and close marks in related classifications.

Eventually, according to William Flynn, director of computer services, the computer will generate the actual reports forwarded to clients, listing all pertinent data about each mark, including the owner, goods, and status of its registration.

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At 10 min. after now, your Teletype can have the convenience of a snap-in, plug-in, built-in acoustic coupler

10 min. after now...



Novation — the acoustic people — have done it again, with a snap-in, plug-in, built-in coupler which anyone can install on a Model 33 Teletype in less than 10 minutes.

You get added Teletype convenience and portability. The coupler is always there when you need it. Coupler controls are right at your operator's fingertips. All you need for perfect data transmission is a telephone.

Novation's unique two-package construction makes the built-in Teletype coupler feasible at last. With the less-than 10 min. installation, the acoustic section easily fits into place using existing TTY screws and snaps. The coupler electronics is housed in a remote box which mounts on the back of the Teletype. Plug in a pair of cables, make a couple of simple connections and you're ready to communicate.

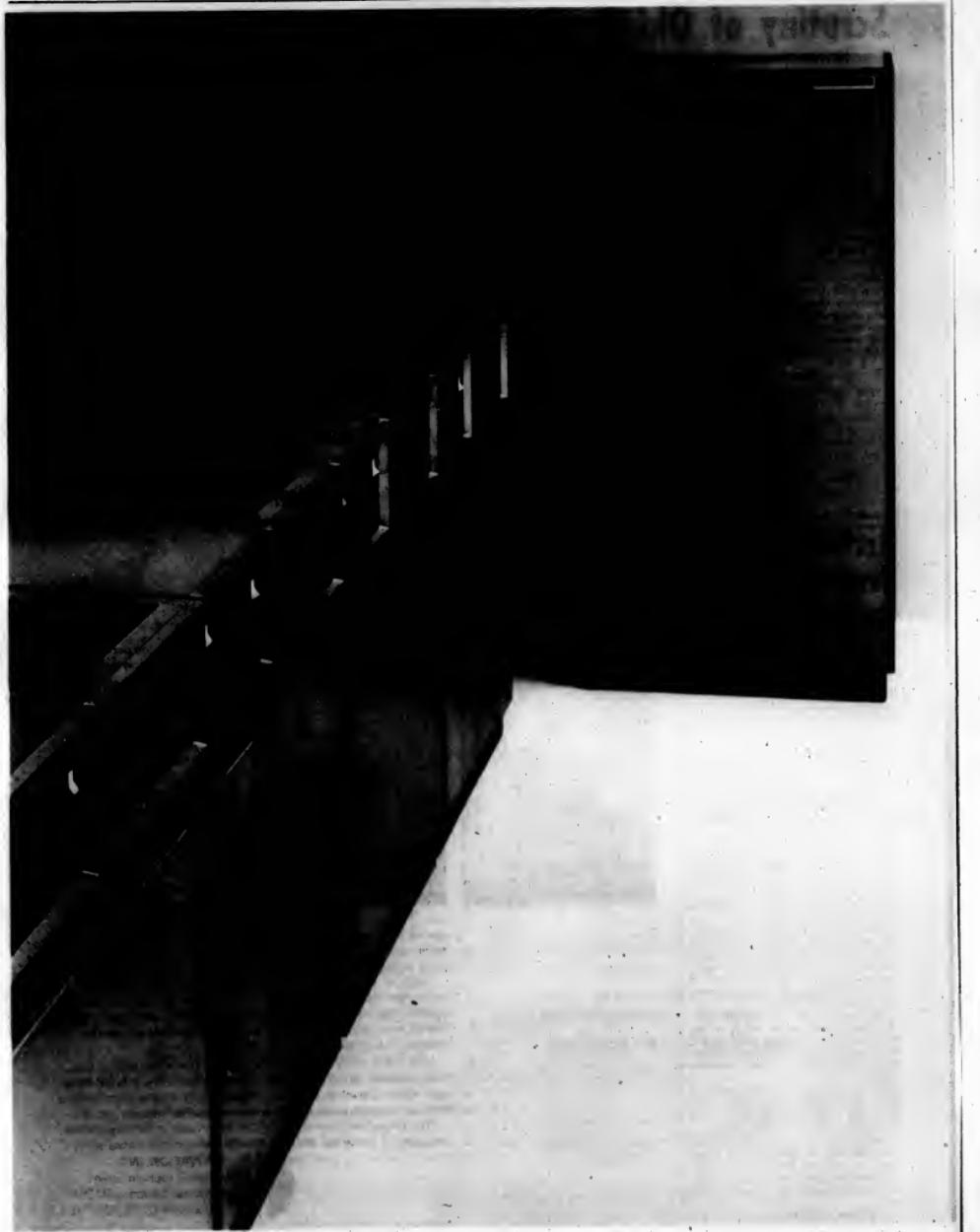
Teltype leasing companies appreciate the TM-102A since it saves them hours of installation time. Teltype servicemen like the Novation built-in coupler because it can be easily unplugged whenever the Teletype needs servicing. Or the remote coupler box can be replaced if ever necessary.

Last but not least, the Novation coupler, by actual test, is the most sensitive, noise-immune coupler ever built. And it holds these tight specs — even as a built-in — because the coupler electronics is far removed from possible interference from the Teletype circuitry.

The single unit price is just \$315. Much less in OEM quantities. Or lease for just a few dollars a month. Send for the entire story.

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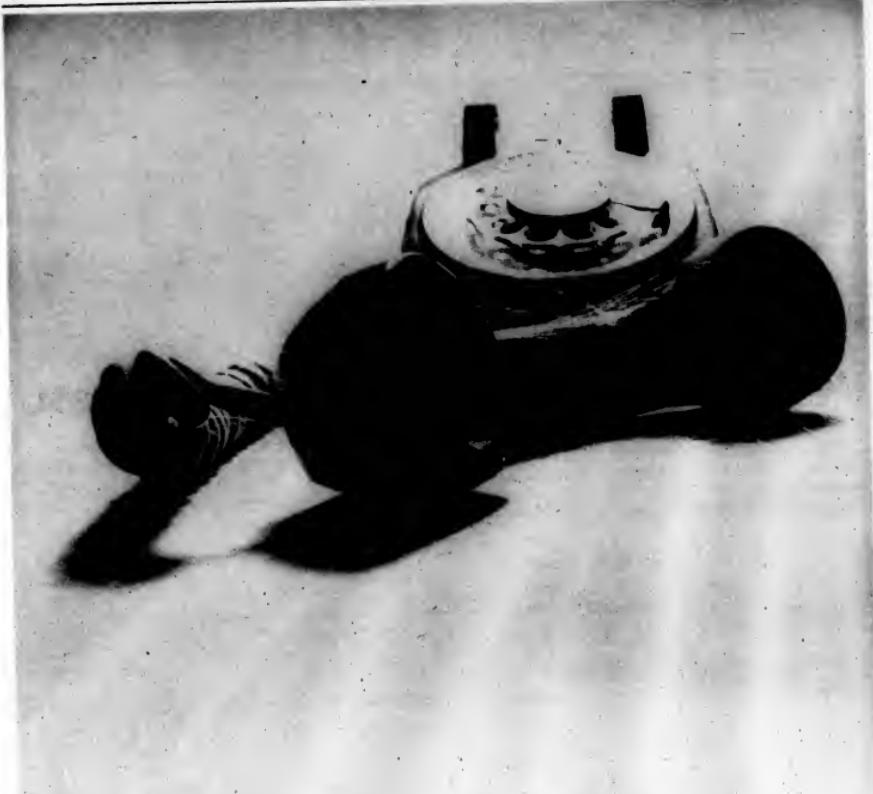
The drive is simple.

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Time-sharing is like renting your very own busy signal.

If your service bureau keeps you waiting, it's probably because somebody else is getting served first.

But now there's a different kind of time-sharing that only you can use.

It's called the Interplex System. It's an in-house system with a 128 general-purpose computer, hard-wired to as many as 16 specially designed terminals. So you don't need phone lines. And because it's your own in-house system, you can use it,

as much as you want without paying an extra cent for it.

It's easy.

Our new time-sharing terminal is the first to combine BASIC language programming with an electronic calculator in a single desk-top unit. So you can do up to 90% of your time-sharing jobs in BASIC without leaving your desk. And for a lot less than you're paying now.

You won't need any more equipment, because the terminal's also an electronic calculator. So you can even stop in the middle of

your own program to run your calculations. And you don't have to wait for anybody else.

This is Interplex System I. It's a different kind of time-sharing. You share it with yourself.



Interplex Corporation
401 Toten Parkway
Nashville, Texas 77214

May 20, 1970

Page 21

'Environ/1' Reduces Size of 360 Core Requirements

By Don Leavitt
CW Staff Writer

CUPERTINO, Calif. — A new operating system allows most IBM 360 real-time applications to be processed in a CPU and core that is one size smaller than is currently required according to the developer. Information Storage Systems Inc. (ISS).

For example, ISS said that an installation with a work load that presently requires a 512K 360/50 can produce the same job throughput on a 256K 360/40 with the Environ/1 system.

The developer also claimed that the system outstrips conventional single- and multi-thread systems in response time, and that the degree of Environ/1's improvement increases as the system nears capacity.

Supports 30 Terminals

The current version of Environ/1 runs under DOS and is said to support about 30 terminals with an average rate of one transaction/sec on a 32K 360. The company claimed that in a 256K system with an average rate of 15 transaction/sec,

the system can support up to 300 terminals.

The system is said to give the user flexibility of record format

three levels of restart protection, and systems performance statistics accumulation.

ISS said that, under Environ/

restricted to fixed-length records. Cism is said to be able to insert 500 records, each 250 bytes long, between two keys on

the system from a non-systems resident device after a total system failure.

The disaster protection permits the user to get the system operating again in less than 30 seconds, ISS said, once the cause of the failure is located or the hardware repaired.

Internal Paging

Environ/1 uses internal paging to locate data and to maintain user logs. This is said to provide a flexibility that resembles the virtual memory concepts of the 360/67. In effect, this allows the programmer to write programs without regard to the physical attributes of terminals and storage devices. All programs and data files are treated as virtual extensions of core memory.

ISS said that the automatic accumulation of statistics on various aspects of hardware/software system performance makes it possible for the user to evaluate current system performance, determine system "bottlenecks" and make appropriate plans in advance for future system growth based on specific facts.

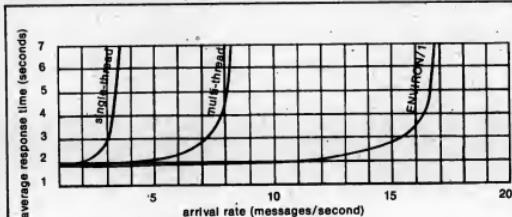
The current version of Environ/1 is written in Assembly language. The company said that a Cobol version is scheduled for release in June.

\$2,500/Mo

The system rents for about \$2,500/mo under DOS. A later OS version is expected to rent for about \$3,000/mo. The company said that it takes complete responsibility for maintenance of Environ/1 programs including support of new releases. ISS said that the cost of implementation of Environ/1 at the user "must make (personnel) available for a one-week training seminar" at the user's installation.

Concepts and facilities manuals, and programmers' reference manuals for the language changes, are included.

Information Storage Systems Inc. is at 10435 North Tantau Ave.



ISS claims the results shown above were based on a test using a 2-channel 360/50 with two 2314-A2s, the multi-thread partition size was 170K bytes, and the multi-thread was 250K, and

in memory sequential file structures, improved access methods, a real-time partition supervisor, Assembly Language macro-instructions and a Cobol subset to improve programmer efficiency,

its compressed index sequential access method (Cism), users can include undefined as well as variable-length records in the index sequential environment, which previously had been re-

stricted to fixed-length records. Cism is said to be able to insert 500 records, each 250 bytes long, between two keys on

the system from a non-systems resident device after a total system failure.

The Environ/1 system can be utilized over the entire range of CPUs, ISS said, from a Model 25 with a 32K partition through the Model 195 with thousands of terminals without reprogramming. A company spokesman said that the system can be converted from DOS to OS/360, without either reprogramming or recompiling, if program object decks are available.

Checkpoint Record

In the event of an application program check, the Environ/1 maintains a checkpoint record, notifies the terminal that was utilizing the program, and continues processing. ISS said that failure of a control program would require no operator intervention. The system would restart automatically. The operator would, however, be required to reload

nancial statements. Other modules cover subsidiary ledgers, account analysis, general ledger, financial statement and comparative analysis. Phases for government reports and for accounts/receipts/credit complete the list of current modules. CAS III is programmed in BAL and operates on 360/25 and up under TOS or DOS.

The system is offered on a one-, three-, five-, 10-year lease arrangement, or on a one- to three-year monthly rental plan.

Because of the variations of modules needed and payment plan desired, Compac has set price for the CAS III system.

Compac Computer Systems Inc. is at 911 Hennepin Ave.,

will automatically lock itself and prevent further output. Compac noted that with this scheme any copies of the program would necessarily have to re-lock features built-in, and would be useless after the current billing period. Stolen packages would, likewise, become useless once the lock-out function took effect.

According to the company, the "lock and key" is a feature of the CAS III system. Designed as a modular accounting system, the company said that new elements have been added since it was first released last fall. The basic accounting module is said to include journals, general ledgers, and fi-

nancial statements. Other modules cover subsidiary ledgers, account analysis, general ledger, financial statement and comparative analysis. Phases for government reports and for accounts/receipts/credit complete the list of current modules. CAS III is programmed in BAL and operates on 360/25 and up under TOS or DOS.

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Compac Computer Systems Inc. is at 911 Hennepin Ave.,

Retrieval Package Has User Orientation

ANN ARBOR, Mich. — User orientation is seen by the developer as the most significant aspect of a time-sharing information retrieval program from Shared Applications Inc.

A spokesman said that, on the original set-up of any job, the user can define the records, fields, and subtotals in his own terms. Anytime thereafter, when the job is run, the specialized vocabulary can be used.

Data retrieval can be random and English is used throughout the operation. Output can be in hard-copy form on a teletype writer or on a CRT display, in listed fashion or as a formatted report.

The program can be installed on CDC equipment with 16K storage. Adaptations to IBM, GE and other processors are said to

be possible on 60 day notice.

Written in Fortran, the re-

trieval package is priced at

\$24,000. Shared Applications Inc. is at 209 E. Washington Ave.

Sycom Provides Machine-Language Subroutines for Cobol and Fortran

ANN ARBOR, Mich. — Callable from either Fortran or Cobol, Xpk/360 provides machine-language subroutines to perform functions that are difficult to accomplish in the higher-level languages.

Developed by Sycom Computer Systems, the subroutines are described as suitable for use on 360/25 and up with the standard instruction set. Some of the subroutines, however, deal with decimal arithmetic and cannot be used on machines not

having a decimal instruction feature.

Sycom said that there are more than 40 subroutines in the Xpk/360 collection, ranging in function from moving characters or arrays, to converting packed and decimal. Each subroutine can be used separately, according to Sycom, without having to load any of the others. The entire package sells for \$35.

Sycom Computer Systems is at 344 S. Division No. 420.



"Look, Priscilla — Everybody's Unbundling These Days . . ."

'Peace' Provides Objective Evaluation of Programmers

MONTCLAIR, N.J. — Managers of systems and programming departments can evaluate their programmers objectively and have cost accounting controls and project status reports generated, with the Performance Evaluation and Cost Effectiveness (Peace) system.

According to the developer, Quantrasand/Automated Inc., the rating phase of Peace provides an index by which managers can compare one individual to other members of his staff.

The company claims use of Peace will provide a uniform method of billing to "customer departments" for systems analysis and programming work performed.

The company said that the individual reports take into account two factors. First is efficiency, defined as the ratio of useful work performed in the time frame available. The second factor, productivity, is defined as the ratio of the amount of time required to complete a given task, compared to the

amount of time estimated for the task.

Quantrasand said that the two measurements effectively counter-balance each other. A programmer who reports more credits less to the system, for example, will keep his efficiency rating high, but, because of his inflated hours, project estimates will be overrun and his productivity rating will drop.

If, on the other hand, a programmer "hides" his time spent on a project in order to stay under project estimates (and keep his productivity high), his efficiency will suffer.

Peace consolidates the two factors into a single "productivity index" so that a manager can, for example, compare one individual having a high efficiency-low productivity pattern with another who has low efficiency but high productivity, the firm said.

The project status reports produced by Peace can be used in two ways, the company said. Formatted as invoices, the re-

ports show the amount of money or internal charges debited against the customer or "user" of the system. Similarly, give the installation manager a control so that he is aware of how much of his budget is being charged out, and how

much is being absorbed.

The Peace system is a series of five programs that are operational on 360/30 and up, under DOS or OS, with 24K core and two 2311 disk drives required. RCA Spectra 70/IDOS and Univac

9400 versions will be available soon, according to Quantrasand.

The Peace system sells for \$3,600, fully installed, including a 26-page manual.

Quantrasand/Automated Inc. is at 293 Broomfield Ave.

Filter Analysis Service Available in T/S

LONG BEACH, Calif. — An analysis service for electrical engineering filter designers has been developed by Systems Associates Inc.

To use the service, a designer selects a filter transfer function from a comprehensive list, de-

fining its geometry, its desired frequency and impedance transmissions.

Written input, the program provides steady-state and transient step and impulse analysis of the function. It also details many other parameters,

including rms and peak-to-peak transmission, group-delay distortion and equivalent noise bandwidth.

According to the developer, the program can realize a passive singly or doubly terminated ladder network, and print out the appropriate element values and topology.

The filter program's output is said to be available in tabulated and printer plot TTY format, or in tabulated line printer and CalComp plot formats.

The analysis service is available in a conventional time-sharing mode through Remote Computing Corp., Los Angeles, or in remote batch mode through the developer.

Spokesmen for Remco said that they charge no initial fee or monthly billing minimum. Connect-time is billed at \$7.50/hr.; I/O time at \$2/min; and CPU time at 15 cent/sec.

Systems Associates says that the charge varies widely depending on designer needs, but rates would basically be on a time-and-materials basis.

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Systems Associates said that its charge varies widely depending on designer needs, but rates would basically be on a time-and-materials basis.

NCR Inventory Control System Suited For Manufacturing, Food Distribution

DAYTON, Ohio — NCR has released the first phase of an inventory control system, Emphasis, addressed specifically to the manufacturing, food, and hard-goods distribution industries.

Designed for the NCR Century series, Emphasis is suited to in-

clude analysis of historical movement of items and selection of optimum models for forecasting of future needs. NCR said it also provides calculations of economical order quantities and re-order points, as well as calculations of discounts and other vendor price variables, to determine the best replenishment strategy for each item.

The system provides an over-

ride capability for the user so that buyers can use their discretion when they see the need.

The system's Phase 1 now available is said to include every feature of the system for implementation. Phase 2 will include preparation of purchase orders, according to an NCR source, but an implementation date for this capability has not been announced.

Written largely in Nest-3, the system requires a minimum of 16K core and utilizes the disks that are part of the NCR-Century configuration.

The Emphasis system is available to Century users without charge.

DYNAMIC DEBUGGING SYSTEM

ASYST

- Receives control of program check or external interrupt.
- Operates in full Batch, MPS, or BJF environment.
- User may alter or display any register, storage or PSW.
- Built in Hex address calculator.



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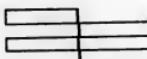
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Potter's new AT 2426 can give you a substantial increase in data transfer rate over your present IBM 360 system. With this plug-in compatible Potter tape unit in combination with Potter's new tape control, you can increase your rate (as the chart shows you) from 33% to 300%.

And it can cost you considerably less. No modification of software or space. Just unplug your present IBM unit and plug in Potter.

Potter gives you automatic tape threading too. Put on the reel, push a button, and in just 8 seconds you're ready to go.

The AT 2426 is the latest addition to Potter's well-known line of single-carpetan tape units, thousands of which are in use on IBM systems. As well as reliable products, Potter provides dependable field service. And Potter's 25-year quality record backs it up.

If you can use higher transfer/rate, we'd like a few moments with you to tell you about the advantages of switching to Potter. Your accounting department may later refer to them happily as golden moments. Call us.

Potter Instrument Company, Inc., East Bethpage Road, Plainview, N. Y.
11803. Tel. 516-694-9000.



Potter.
A lot more than less expensive.

System Keeps Modules on Tape, Disk Files

DALLAS — Users can gain ease of assembly or compilation across a wide range of languages with Program/Manage, a system for maintenance of source programs and modules, according to Management Systems Corp. (MSC).

Because the system maintains source programs on tape or disk files, rather than on cards, MSC said that users also gain im-

proved security and organization of source libraries with Program/Manage.

Autocoder, Cobol, ALG, Fortran, RPG, BAL, Exodus, and COBOL are supported and maintained by the current version of the system, according to the company. Other languages may be added later.

The system posts source program modules to a tape or disk

file, assigning a serial number to each card or statement of the program. To assemble or recompile, the programmer uses one-line instructions to identify the steps to be changed and the way in which they are to be changed.

Program/Manage uses the previously stored source program and the change instructions as input to the appropriate as-

sembler or compiler. In addition to the revised assembly/compilation, the system is said to store the revised source program on the tape or disk program library, in place of the old.

MSC said the system also produces a "program modification" log, a listing of both old and new instructions that have been deleted, altered or added. Using this log, programmers can reconstruct any version of the program without having to keep a file of each compile, according to MSC.

The developer said that Program/Manage is written in Cobol and could reasonably be implemented on any system that supports a Cobol compiler. The system is presently operational on an RCA Spectra 70, and a 360/30 with 310K, utilizing TOS, DOS, and OS. Modules that required peripherals include printer, card reader, punch, console typewriter, and tapes and/or disk to accommodate three files.

Available now, Program/Manage is priced at \$2,485, which includes installation, MSC said that the system can be copied and installed elsewhere within a purchaser's corporate structure without charge. Installation time frame is said to be three days.

Management Systems Corp. is at 7007 Preston Rd.

FOR RENT
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Slope/RCC Gives Slide Safety Factors

LOS ANGELES — Civil engineers can use the Slope/RCC program to determine safety factors against sliding down the sides of dams, roadways, canals, and other earth slopes.

Available through the Remote Computing Corp. (RCC) time-sharing network, the program utilizes data values and specifications supplied by the engineer. With these, the company said, Slope computes the safety factor for any potential failure arc, or for the critical arc when a family of arcs is defined.

After a \$25 initiation fee, the Slope program, and any other in the RCC library, are available to a user.

An RCC spokesman said that

CPU time is charged at 10 cent/second, while I/O time costs \$2/min. Basic connect-time, he said, is priced at \$7/hr. There is no

minimum monthly billing on the RCC network.

Remote Computing Corp. is at One Wilshire Bldg.

'Municomp' Suited for Attorneys

WASHINGTON, D.C. — Municomp, a service consisting of an automated computerized municipal law search and retrieval system, is available to municipal attorneys from Autocomp.

By the end of 1970, Autocomp projects that 40,000 municipal law court cases will be available to the computer. The municipal attorney utilizes Municomp by phoning, wiring, or writing his search inquiry to Autocomp, employing key

search words and terms.

Municomp then produces, from the company's IBM 360/40, all the citations and summaries of court decisions containing the words or terms of the inquiry.

Initially, Autocomp plans to offer a service available at \$40 per search to attorneys representing some 30,000 cities.

The company is at Suite 902, 4720 Montgomery Lane, Bethesda, Md.

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IPS has for sale or lease and immediate delivery from its own inventory a 360/20 system and one 2401-3 unit. The 360/20 is a C1, 8K, with 22030 Processor, 2501-A1 Card Reader, and 2560-A1 MFCR. Price is \$65,000. The 2401-3 30KB drive is available for \$21,000 as a 7-track unit or \$24,500 as a 9-track unit. Both items also available for 2-5 year leases. Please call or write for additional information. Also write for our Bulletins listing other computer equipment for sale or lease.

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Unbearable input?

It takes a lot of berries to feed a big input-bound central processor.

That's why Inforex developed

Intelligent Key Entry™.

Inforex feeds hungry CPU's. It does electronically what other forms of data entry do mechanically.

The Inforex system gathers data from eight keyboards into one disc memory unit. Data may be sight or key verified. Built-in logic performs check digits, left-zeros and balance totalling. Jobs are pooled onto 7 or 9-track compatible tape. Optionally, it will operate on-line directly to your central processor.

Keypunch/verifier functions.

Starting with the familiar 64-character keyboard, each Inforex keystation performs all keypunch and verifier functions: Automatic check-digit computation. Automatic left zeros. No digit by digit keying is necessary. Electronic skipping and duplicating rather than mechanical.

Auxiliary duplication or two additional levels of program control. Automatic + or - signing of fields.

Simultaneous entry and verification. All eight keystations input to one disc memory unit. Each keystation is assigned an area, as it enters. Any keystation can access any assigned area at any time.

Since each keystation has both sight and key verification capability, one keystation can verify work entered on another and if desired, verification can be done simultaneously with data entry.

Keyboard to tape functions.

Inforex automatically pools input from up to eight keystations onto 7 or 9-track compatible tape. One easily entered statement transfers a series of batches. Only one keystation is required to initiate the transfer, and all keystations are functional during transfer. There are no cartridges to handle or identify, no special equipment needed for pooling.

Recallable programs. Each program has four levels of control. Once the program is keyed, it can be stored for future use and recalled by any operator merely by keying its appropriate program name. Up to 128 different program controls can be stored. There's no program card or tape mounting and no repetitive program control keying.

Self-balancing. Zero balancing is an integral part of the Inforex system. Each operator may accumulate a control total during data entry. Edit controls allow rapid correction. Adjustments to

the balance total occur automatically during verification.

125-character records. With Inforex Intelligent Key Entry, the record length is variable up to 125 characters.

Full record display. For added accuracy, each keystation displays an entire 125-character record with moving cursor and position counter. The system has a form capability that allows data entry and verification in a "fill-in-the-blank" fashion. Operator messages for direct interaction with the system along with search and paging of a file are standard.

Attractive office decor. Inforex design innovation doesn't stop with the components. Each Inforex keystation is built into an attractive contemporary walnut and black steel desk designed for operator ease and comfort. And remember, the system is electronic, not mechanical, allowing a quiet, comfortable atmosphere to work in.

Inforex monthly rental cost is \$50 per keystation, \$560 for control unit (up to 8 keystations).

\$960 for a complete 8 keystation system, including maintenance.

Inforex, Inc., 21 North Avenue, Burlington, Mass. 01803 or, Inforex AG, Dornacherstrasse 210, Basel, Switzerland.

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means to an end.





- MTP Series Teleprinter

Electrostatic Printers Handle 266 80-Character Line/Min

PHOENIX, Ariz. — A series of electrostatic printers can print 266 80-character line/min on 8 1/2 x 11-in. paper, according to the manufacturer, Motorola Instrumentation and Control, Inc., a subsidiary of Motorola, Inc.

Called the MTP Series Teleprinters, the printers are designed for the use of impact, dot-matrix, dry process machines which print at speeds faster than conventional impact printers and are less expensive than line

printers.

The MTP series uses a Motorola-patented technique to form characters by manipulating a 7x5 dot matrix, producing a character equivalent in size to 10-point type. With appropriate software, the dots can be used to form four-line characters or special symbols.

MTP Features

The Motorola MTP Teleprinters series includes:

- The MTP-10, a basic model which accepts a dot-matrix input, either directly from a processor, or through a Uucspic-to-dot-matrix integrated conversion circuit.

- The MTP-20, with a built-in, two-character buffer and ready-stroke interface for direct 7-bit parallel Uucspic input in local, hardwired applications with multiple interfaces.
- The MTP-30, which includes an external 200-character buffer-controller and interface for a Bell 202C modem or equivalent, for dedicated communications service.

An electrographic printing process is used in MTP Teleprinters.

Characters are formed by four continuously-moving print heads which make contact with continuously-moving, current-sensitive paper. As one head completes a line, the next head moves into position to start the next line. Each head prints one character of every four. There is no paper start/stop-delays between lines.

The MTP can operate unattended. An automatic paper advance prevents hidden lines. Either local or remote control can be used to cause the last line of a message to clear the printer before the printing mechanism stops.

The MTP-10 Teleprinters are available at a 60-day delivery schedule; the MTP-20 on a 90-day schedule. Both are currently in production, Motorola said. The MTP-30 is scheduled to go into production in October, 1970, and is currently being scheduled for delivery on a six-to-eight-month schedule.

The MTP-10 is priced at \$3,650, the MTP-20 at \$4,995, and the MTP-30 at \$7,995.

Atlantic Scientific Data Terminal Has Unattended Transmission Capabilities

PLAINVIEW, N.Y. — A typeewriter-size terminal from Atlantic Scientific offers unattended transmission capabilities at low cost.

Called the ASC 1003 Branch Office Terminal, the device is intended for use by relatively small installations with several branch offices, such as smaller banks and insurance companies.

The ASC 1003 is capable of storing numeric data on a mag-

ASC 1003 transmits the message recorded on tape and rewinds automatically to the beginning of the message, simplifying retransmission, should it prove necessary.

An optional feature on the terminal allows visual verification of numeric data while it is being punched.

Still another option is a 30 char/sec printer that allows the

\$500 and the printer has been priced at approximately \$2,300. Lease price for one year on the basic model is \$115/mo excluding maintenance, which is negotiated under a separate contract.

The ASC 1003 is available on a 10-day delivery schedule.

Atlantic Scientific Corp. is at 121-03 Dupont St.

IBM-Compatible Tape Unit Incorporates Multimode Drive, Reads Incrementally

NORWALK, Conn. — An IBM-compatible magnetic tape unit offered by Datran Corp. incorporates multimode drive and read/write circuitry.

The two configurations of the unit — the 7-track Model 8551 and the 9-track Model 1 8552 — also incorporate electronics logic. Standard features of the units include: triple density, incremental reading ranges from 0 to 500 char/sec, reading in slew mode at 1,000 char/sec. When reading incrementally, the device can shuttle back and forth over a single character, preceding a character rather than block buffering, the company said.

In synchronous mode, the standard tape speed is 30 in./sec with IBM compatibility, and bi-direc-

tional operation within standard IRIG Modes and densities are selected by means of manual switching, making the unit suitable for remote communications terminals or as a combined peripheral and communications terminal.

The Model 8551 (7-track) with read/write capability, triple density, and either incremental or synchronous mode is priced at \$6,600. Delivery is 90 days.

Datran Corp. is at 179 W. Rock Rd.

T/S CRT Terminal Displays 72 Char/Line

PENNSAUKEN, N.J. — A CRT Terminal from Video Systems Inc. handles data up to 1,200 baud can display 72 char/line for time-sharing users.

Called the VST 2000, the teletype-like, non-volatile, interchangeable

unit can handle interactive computer communication requirements with no hardware or software modifications, the company said. The terminal utilizes a standard typewriter keyboard and a 16x16 dot-matrix line keyboard for numerical data entry. It can be used on- or off-line.

The VST 2000 has a two-page

capacity,

one on the screen and

one in storage.

When the last line of

the first page on the screen

fills up, the page is automatically put in storage and the second page appears on the screen.

The unit can store 2,592 char-

acters, each display page having 18 lines with 72 char/line. Numerals and letters on the screen are said to be uniform, stable and legible. With a keyboard cursor, selection, insertion, deletion, and relocation can be accomplished.

The VST 2000 handles data transmission rates of 110, 150, 300, and 600, and 1,200 baud.



VST 2000 CRT Terminal

The 18-in. square unit has a 12-in. video screen.

Delivery is 60 to 90 days for the VST 2000 terminal which sells at \$4,590. A one-year lease is about \$160/mo. Maintenance is additional.

Video Systems Corp. is at 7300 N. Crescent Blvd.



ASC 1003 Branch Office Terminal

netic tape cartridge, with a capacity of 100K characters, and transmitting the data over telephone lines using a Bell 202 modem, at speeds up to 1,050 bit/sec. A keyboard that allows alphanumeric data to be recorded is available as an accessory.

In addition to data recording, the keyboard is equipped with addition and subtraction keys. As data is punched, it is also recorded on magnetic tape. The depression of a function key causes the printer to read the tape like a conventional adding machine. Errors are corrected by generating a special character on tape following the erroneous data.

In response to being polled by a communications network, the

unit is to be used to produce hard copy of data received through the terminal.

Alternatives

In place of the standard Ascii, the user may specify alternatives such as EBCDIC or BCD. The modular construction and plug-in design of the components, Atlantic said, make the terminal very easy to service. A specialized technician is not required, since most service is performed on-site. More serious problems will be handled on a representation basis, the company said.

The ASC 1003 is priced at about \$3,700. The optional alphanumeric keyboard is priced at \$600. The numeric data visual verification option will cost



Telex Multiformat drive



Telex Drives Read 1,600 Char/In on COM Systems

TULSA, Okla. — Two multiformat, read-only tape drives with 1,600 char/in. capability, for computer output microfilm (COM) systems permit the handling of three formats in a single peripheral.

According to the developer, Telex Corp., the 4853 and 4863 drives allow for reading a 9-track phene encoded, or 7- or 9-track NRZI, by flipping a switch.

The 4853 offers a 75-in./sec. tape speed and maximum transfer rate of 120 kilobytes. The 4863 is faster at 112.5 in./sec with a maximum transfer rate of 180 kilobytes.

The drives are said to eliminate the need for peripherals previously required to perform the identical read operations. Floor space necessary for one multiformat drive is said to be less than that of competitive drives generally required for COM use.

Telex said that power required for operation is reduced and that unplugging is not required when switching formats.

The drives accept standard industry formats, and can interface with COM systems such as Stromberg-Carlson Datagraphic Microfilm Recorders, and Kodak KOM-90 Microfilmers.

The drives are available on 60- to 90-day

delivery schedule. The 4853 sells at \$21,400, and leases at \$553/mo for four years; service is \$102/mo. The 4863 sells at \$22,900, and leases for four years at \$577/mo; service is \$118/mo.

The address of Telex Corp. is Box 7626,

the company said.

Reporter uses DEC hardware: PDP-8/I processor, Decates with three or more transports, 22K-magnetic disk, paper-tape reader, and either a paper-tape punch, or a 300 line/min printer. Input data is prepared on Friden Flexowriters.

"We sell the software," Tony Padula, Foster's graphic arts manager said, "so we can offer the complete system hardware and software. However, if the newspaper already has a DEC computer doing typesetting, for example, we will sell any software packages required to run on his present system."

Ease-of-Use

Padula described the payroll function as an example of the ease-of-use features claimed for the system.

"First, Reporter concentrates payroll records onto a single file of magnetic tape in the payroll file. The payroll clerk creates the file by entering the necessary employee information: name, address, employee number, social security number, marital status, number of dependents, and all earnings and deductions," he said.

"Then, when checks are issued, the clerk answers questions that the system asks. The system is flexible enough to handle special pay, bonuses, and up to six deductions. When the questions are answered, the clerk readyes the printer with checks and starts the program."

Padula said the system can write up to 100 checks/hr. When the payroll is completed, the master file is automatically updated.

Prices for the Reporter system range from \$55,000 to \$200,000. A typical configuration, which would consist of an 8K PDP-8/I, Decate with four drives, 32K disk, line-printer, and two Flexowriters, is priced at about \$120,000. These prices include all software packages, in addition to nine to 10 weeks of on-site training.

The Reporter system is currently available on a three- to five-month delivery schedule.

The Fordax Corp. is at 20 Walnut St.



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GCS NOW OFFERS a general purpose, multiple company payroll, all standard features, plus many more for \$6000.

GCS HAS GIVEN top priority to systems design — modular construction to simplify changes and modifications.

THE GCS SYSTEM WAS DESIGNED to operate in three distinct phases. The independency of the three phases permits the user to schedule production of any phase to meet his data processing requirements.

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THE GCS SYSTEM IS DESIGNED for use on IBM 360 Mod 25 or above, and RCA Spectra 70/35 or above.

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General Computer Services, Inc.

Intertran Modems Vary Speed Rates

LOS ANGELES — Two data sets for transmission full-duplex synchronous transmission over twisted pair four-wire facilities are available from Computer Transmission Corp. (CTC).

The Model 915 provides standard EIA RS 232C interface, operating up to 20,000 bit/sec. The other model in the Intertran series, the Model 916, provides interface from 10,000 to 250,000 bit/sec. The rates can be changed in the field to meet changing user requirements, the company said.

The Intertran series uses TTL integrated circuits (MSI medium-scale integration), and contains built-in, local and remote loop-back test capabilities.

The data sets achieve instantaneous data transmission using an innovative phase-lock loop circuit, and can be equipped with either internal or external clock.

The Model 915 costs \$1,875 and the Model 916 costs \$1,925. Delivery is 30 days.

Computer Transmission Corp. is at 1508 Conner Ave.

Heat-Developing Microfilm Uses Light Scattering

SUNNYVALE, Calif. — Heat-developing microfilm "ideal for duplication of computer output microfilm" is being offered by Xidex Corp.

Designated Xidex-HD, the microfilm is based on light scattering principles, developed with heat and requiring no chemicals or dark room for processing, the company stated.

The film is compatible with all presently available heat-developing processors. Dur-

ing normal processing Xidex-HD is stable up to 160°F, the company said.

The film, available with three-mill and four-mill polyester bases or in special sizes upon request, has a diffuse density gamma of 2.5, a resolution of 200 line/mm, a gamma of three, Xidex-HD has a 1.30 log exposure scale and provides over 200 line/mm resolution, the company stated.

Xidex-HD is guaranteed. The company provides immediate replacement if the customer is not satisfied.

Xidex-HD in 16mm, 1,000 feet, with three-mill polyester base costs \$15.30/roll. Price decreases with quantity ordered.



Datagraphix 96 Kalver Film Copier

Other standard sizes and lengths are available. Delivery is 15 days, and the company ships the film prepaid air freight.

Xidex Corp. is at 305 Soquel Way.



Copier Makes 120 Microfiche /Min

SAN DIEGO, Calif. — A 105mm microfilm copier can produce 120 microfiche (4 in. by 6-in. card)/min, according to the manufacturer, Stromberg Datagraphix Inc.

Designated the 96 Kalver Film Copier, the equipment produces copies on Kalver

\$20,000. A lease for 60 months is offered at \$505/mo. Maintenance is \$100/mo. A four-year step plan is available, at an average of \$550/mo. Delivery is one month.

The address of Stromberg Datagraphix Inc. is P.O. Box 2449.



Xidex-HD Heat-Developing Microfilm vesicular film from suitable 105mm (microfiche) roll film masters. The copier offers solid-state devices for tension and temperature control.

The printing capability is up to 550 feet of 105mm Kalver film at a transport speed of 60 ft/min, and consists of a dry process requiring no chemicals, no special plumbing, and no darkroom. The only electrical outlet required is for hook-up. The dry-copying process provides for exposure of the film to ultraviolet light and development by heat in ordinary daylight office environment, the company stated.

The 96 Kalver Film Copier costs

SP-100 Perforates Tape at 10 Char/Sec

CHICAGO — A self-contained, 10 char/sec, 8-level tape perforator is available from Data Specialties Inc.

Designated the Model SP-100, the device features features for supply and take-up of 1,000 feet of tape, torn tape alarm, tape out alarm, feedout switch, on/off switch, and tape release lever.

The unit is said to utilize no power in the standby mode and is enclosed in a shock-mounted, sound-insulated cabinet which has a hinge front panel.

The cost of the SP-100 tape perforator may be purchased, in unit quantity, for approximately \$300. A variable cost is added for the necessary electronics. Delivery is 30 days.

The address of Data Specialties Inc. is P.O. Box 45284.

TXW News To Computerworld
F-A-S-T
TXW 710-336-6635

Logically speaking... an error-free data input system keeps your computer from going "out to lunch."

A computer should eat up data, not expensive time. If we make it sound overly simple, we're just being logical.

For we've got an error-free data entry system that keeps computers working without those costly "out-to-lunch" breaks.

It's called the LC-720
KeyDisc Data Input System.
It cuts systems time and costs... by as much as 50%. It minimizes errors with point-of-entry editing and correction.

It optimizes systems throughput.

And it keeps your computer working all the time.

Computer time-shared data from up to 60 key stations... all entering or verifying separate jobs and applications... is one of the big advantages of the LC-720.

It also offers you total security and high speed random access of data.

The LC-720 is the only

keydisc system in use that provides a complete IBM-360 compatible disc. Plus a totally compatible 7 or 9 track magnetic tape output.

Logic makes the *New Generation* of data collection systems. So, if you've got data input problems, Lewis Barr at Logic can more than likely solve them. Give him a call, 609-424-3150.

It's the *logical* thing to do.

LC-720 KeyDisc System

LOGIC
CORPORATION



21 Olney Avenue • Cherry Hill Industrial Park • Cherry Hill, N.J. 08034 • (609) 424-3150

Tab Converts File Equipment for S/3

PALO ALTO, Calif. — Accessories to convert standard card file equipment for use with IBM S/3 cards are offered by Tab Products Co.

Model 1603 aluminum inserts fit into standard card file drawers for conversion to S/3 card use. Card file drawers require a set of two inserts each, with storage capacity of 7,500 card/set. Inserts include follow-blocks with specially formed sides for storage handling. A set of Model 1603 inserts costs \$4.75.

Model 3905 open reference trays are designed to convert open reference files for S/3 card

storage. Each tray holds 3,225 cards and is available with optional tilt-blocks and/or follow-blocks.

Capacity of standard tab open reference files is nine Model

dp accessories

3905, trays per 37-1/2 in. file; 16 trays per 56-in. file; and 18 trays per 68-in. file. Price is \$6.50 per Model 3905 tray.

Tab Products Co. is at 2690 Hanover St.

COMPUTERWORLD



Tab's S/3 Accessories

Cleaner-Certifier Has Own Tape Drive

WAYNESBORO, Va. — A magnetic tape cleaner-certifier featuring a self-contained tape drive is available from Virginia Panel Corp.



Tape-Cleaner Certifier

The Model 14 can handle 556-, 800-, or 1,600-bit/in. tape, according to the company. The unit cleans in wind position and certifies during rewind. Cleaning is accomplished by both a razor blade and silicone-impregnated tissues.

A digital six-digit readout counts errors and a strip chart recorder indicates their location on the tape. The threshold of allowable dropouts may be set to read at desired levels from 0 to 100%. The certifier can be adjusted to read tape windows of any length, and the device can be matched to read the length of

any given file recording block, the company said.

Other features include precision winding during certification of tape at tension specified by tape manufacturers; constant speed during cleaning and certification; read/write heads which retract during cleaning; and cleaning tissues which retract during certifying.

The portable unit sells at \$8,900. Delivery is about six weeks.

Virginia Panel Corp. is at 1400 New Hope Road.



The Novar 10 key numeric input on the right can be added to Novar tape terminals by plugging it in. Greatly speeds up the terminal's capability to handle numeric data for computer processing. Does columnar tabbing too.

Novar Corporation • 2370 Charleston Road
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Offices in Principal Cities

novar

Photoelectric Punched Tape Reader

HAWTHORNE, Calif. — A photoelectric punched tape reader is scheduled for late August delivery by Remex Electronics, a division of Ex-Cell-O Corp.

The Model RR-1150B punched tape reader uses 150/in. reading speed and direct operation, the company said. The device includes integrated circuits with TTL, DTL, and RTL compatibility, long-life cartridge lamp, and low inertia stepping motor/sprocket wheel drive for rapid response for both direc-

tions of reading.

The RR-1150B costs \$560 including electronics and power supply.

Remex Electronics is at 5250 W. El Segundo Blvd.



RR-1150B

DON'T INSTALL 2260's

(or any other
key-driven terminal)

without
GRAPHICS
a complete software package



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**WHO KNOWS
WHAT EVIL LURKS
IN THE HEART OF
A COMPUTER?**

You do.

But do you know where most of the everyday evil comes from?

Tape.

The tape you feed your computer every day. Tape breeds evils like errors and drop-outs because of pile up from iron oxide debris, dirt, dust and physical mishandling.

Over the years, one company has led the battle for clean tape.

The Kybe Corporation.

In fact, over 70% of the people who maintain tape rely on Kybe. For tape cleaning, testing, recertification and library analysis.

Kybe can help you set up a complete tape maintenance system in-house. Or handle your tape maintenance at a Kybe service center.

Either way, tape problems will be only a shadow of what they used to be.



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Telephone (617) 865-0514
Offices & representatives worldwide

THE 7-WEEK-OLD COMPANY THAT HELPS RESERVE SEATS ON MAJOR AIR- LINES, FILL ORDERS FOR A GIANT RETAILER, RENT CARS AROUND THE NATION, ROUTE FREIGHT CARS, TEST-FLY NEW JET LINERS, KEEP MUTUAL FUND ACCOUNTS UP TO DATE, PROCESS INSURANCE POLICIES, AND MUCH MORE: **SANDERS DATA SYSTEMS, INC.**

On March 16th Sanders Associates announced the formation of a new division—Sanders Data Systems, Inc. Although new in name, the organization has a proven base of technological and marketing competence. Sanders already has the broadest line of commercial data display and display systems in the entire industry, with hardware, software and customer services supplied by various divisions. Now these capabilities are consolidated in a single organization.

LEADING FROM STRENGTH

Several years ago, Sanders introduced its multi-terminal data display system. It was a product of the same skills and knowledge we utilized to develop the first V check-out systems. This data display remains the most versatile computer input/output device around. And today, Sanders is the recognized leader in data display, with a long list of satisfied customers in business, science and industry to prove it.

DEPTH IN DISPLAYS.

Sanders offers alphanumeric display systems for stand-alone and multi-terminal demand and on-line data terminal-rental. This is the world's most advanced interactive graphic display system. Sanders has even come up with a key-to-tape system that speeds source data input to computers, replacing the punched card.

TOTAL SYSTEMS APPROACH.

Sanders has also developed data communication and management information systems that answer total customer requirements. Our service-oriented systems analysis, through hardware and software implementation, to continuing maintenance support.

VOLUME PRODUCTION.

Data displays and systems hardware are manufactured by Sanders at its Nashua headquarters. This is a high-volume operation utilizing the latest automatic production and test equipment. Other Sanders plants handle subassembly of various hardware components.

NATIONWIDE CUSTOMER SUPPORT.

There are 23 sales offices and 40 service centers, located at major population centers from coast to coast. Customer support is also readily available to customers in Canada and the United Kingdom.

SOLVING YOUR PROBLEMS.

Our new company, Sanders Data Systems, Inc., combines all the strengths of Sanders' advanced technology to meet the challenges of the commercial market. Sanders' versatile organization can help you solve your problems.

For more information, call your nearest Sanders office or write to Mr. Raymond A. Zell, Vice President of General Marketing, Sanders Data Systems, Inc., Daniel Webster Highway South, Nashua, N.H. 03060.

MEN WHO KNOW WHAT THEY WANT,

KNOW SANDERS.

Sales Offices: Atlanta/Boston/Buffalo/Chicago/Cincinnati/Cleveland/Coral Gables/Dallas/Denver/Fort Worth/Hartford/Houston/Los Angeles/Milwaukee/Newark/Nashua/Phoenix/Pittsburgh/Richmond/San Francisco/Seattle/Washington, D.C./Toronto, Canada/Hong Kong.



Honeywell 200 Users Discuss EDP Education Problem

By Stanley Nodvik
Special to Computerworld

NEw York — EDP education was the main theme of the Honeywell 200 Users Conference attended by approximately 150 members, at the New York Hilton, last month.

The conference agreed that most DP managers deal effectively with hardware and software, yet neglect "peopleware." As a result, without competent, knowledgeable personnel, most third generation shops are still operating in a second generation and even an EAM environment.

The acute shortage of programming personnel has resulted in different companies bidding against each other and thereby inflating the salaries of programmers and analysts.

An estimated 50,000 positions are now unfilled in the DP field. Various possible solutions to meet this need, which is

basically a personnel and education problem, were discussed.

Steve Tamm, manager of Advanced Honeywell Institute of Information Sciences, Eastern Operations, explained Honeywell's solution.

In June, 1969, Honeywell established a model school in Boston open to the general public. The training program lasts for 12 weeks, and costs \$1,850. No prior EDP experience is required, although a college degree is necessary to qualify for entrance as well as aptitude testing and an in-depth interview.

Thirty-five percent of the applicants are turned away as unqualified. A second course was established in September especially for those non-college graduates. It is on a part-time basis, 12 hours a week for nine months for \$1,750.

Bill Patton, general sales manager of Honeywell's East Coast Division, stated that Honeywell will not budge, and will continue its EDP education programs

to its customers. He stated that the newly-published education programs (institute, on-site training, and seminars) are considered additions to Honeywell's full services.

Also presented at the conference was a report by Mike Walker about Honeywell's new software and program development plan. A profile file describing each customer has been prepared. Software and publications needed according to his

individual equipment and system configuration will be sent directly to the customer as they are released. In the past, these services were provided through the local Honeywell branch offices.

Jack Quinn gave a report on the last meeting of SPC (Computer Special Interests Council), which plans to submit to Codat a suggestion for a routine called Prim to handle with Cobol variable tables that change from day to day in a program.

Computer Career Opportunities, Requisites Described in Booklet

MONTVALE, N.J. — Career opportunities in the computer field, and their requirements, are described in a new 12-page booklet prepared by the National Better Business Bureau (NBBB) and the American Federation of Information Pro-

cessing Societies (Afps).

Called *Careers, Computers and You*, the booklet has been published in response to strong interest in the field by students and adults, their need for factual information, and the need for consumer information on private schools offering computer courses, according to NBBB and Afps.

One section, devoted to major job categories, describes the duties of each posi-

Societies

tion, its educational or training requirements, and any special skills needed.

Additional sections cover growth of the computer field, a basic description of data processing, methods for self-evaluation of interest and aptitude, general job information, sources of education and training, and a list of 10 recommended guidelines for evaluating private schools.

One job category, programming, is broken down into three main types — scientific applications, business applications, and systems programming.

Other positions listed are clerical and keyboard, computer operators, systems analysis, customer service, marketing and sales, and designing and manufacturing.

A separate section is devoted to private EDP schools which offer such courses as business applications programming, computer operators and key updating. Many of the schools approach to offer valid programs and undoubtedly are providing worthwhile preliminary training," the booklet says. "However," it adds, "the prospective student should do a bit of homework prior to enrollment." Suggestions include checking on the schools with independent groups or state Employment Services, the local Better Business Bureau, state office of education, major employers of computer personnel in the area, persons actively working in the computer field, and the Veterans Administration.

Persons interested in such schools are advised to contact one of three national groups headquartered in Washington, D.C., which accredit private EDP schools. They are the Accrediting Commission of the National Association of Trade and Technical Schools, the Accrediting Commission for Business Schools, and the Accrediting Commission of the National Home Study Council.

According to Richard Maxwell, NBBB president, and Dr. Richard I. Tanaka, Afps president, the new booklet marks a major step in a cooperative program by the two groups to assure that the public is properly informed in areas where the computer impacts the average citizen.

A copy of *Careers, Computers and You* may be obtained by sending 25 cents to the National Better Business Bureau, 230 Park Avenue, New York, N.Y. 10017. The booklet also is available in bulk quantities.



Kick the smoke habit



Smoke signals are fine for giving the Indian sign. They're far too slow for pow-wowing with a remote computer. Still, there are people using puff-at-a-time, typewriterlike devices that take many moons to complete printouts... but while computer time is elapsing and running up the bill.

Typewriter is the all new terminal printer that brings remote data printers out of the pioneer age. It has space age specs like 100 lines per minute, ASCII 64 character set, plug-to-plug compatibility with CRT display terminals and modems.

And it's quiet. Our Typewriter doesn't make war whoops every time it prints. We've designed a totally new mechanism for minimal noise and even gone to the trouble of turning off the cooling fan during startup.

Lines of crisp character type in multiple copies are produced by Typewriter's unique Crosspoint print head. With few moving parts, this head prints clear, easily readable text, yet needs only minimal maintenance that other mechanical marvels require.

Very little wumpum rents the Typewriter. You can have one for \$245.00 per month with delivery within 90 days. And you needn't worry about service. The Typewriter was designed to shrug off maintenance that other mechanical marvels require.

If you're ready to give up that old tribal custom of using a character-at-a-time printer, let us tell you about the Typewriter. Circle the bingo card, write or phone our big marketing chief, Chandler J. Williams. Then watch our smoke.

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Survey Says 80% of 1,100 Schools Use Computers

SILVER SPRINGS, Md. — First reports of a survey investigating nationwide uses of computers in public high schools were released recently by Dr. Arthur Korotkin of the American Institute for Research. Sponsored by the National Science Foundation, the survey involved about 24,000 of the nation's public high schools. According to Korotkin, the purpose of the survey is "to estimate the number of computers used in the country's secondary schools with main emphasis on trying to find out what the major use of computers is, administrative or instructional or both. The purpose is also to identify a sample of users from which a follow-on, in-depth study would be done."

Replies have been received from about 1,100 schools. Of this number, 80% stated they were using computers in some capacity. About 500 were using them in administrative work only, such as payroll, while about 600 were using them for

both administrative and instructional work.

Education

100% Usage Increase

Korotkin cited the "100% increase" in the use of computers in the last few

years, but added that "it is rather too bad that when a computer goes into a school it is used only for administrative purposes. As long as the computer is in the school, it should make instructional use of it as well."

Breakdown on the use of computers in the high schools is as follows: 43.4% have their own equipment; 13.5% are using nearby college facilities; 28% are using commercial facilities; 5.6% did not specify usage, and 9.5% represent a regional consortium.

Variety, Expanded Use of CAI Programs Foreseen

NEW ORLEANS, La. — "Computer-assisted instruction (CAI) has been suffering from a teaching machine syndrome with high-priced equipment and too few instructional programs," said Ronald P. Fox, president of Executive Computer

Systems Inc. (ECS), Chicago, at the meeting of the National Association of Users of Computer Applications to Education.

Fox said a definite trend developing in the computer-assisted instruction field, "More firms are competing in the market,

Asked what the follow-on, in-depth study would consist of, Korotkin said that of the 1,100 high schools that replied, 50 would be selected, and interviews would be carried out to do a survey of what application a computer in a particular school was being put to, and what funding a school had.

Because the response was not all Korotkin hoped for, a third mailing is being sent out to all high schools, consisting simply of a post card asking whether the school is or is not using a computer.

computer companies are lowering their costs for hardware and education are increasing computers in curricula. The combination of these factors," he continued, "makes it conceivable that computer-assisted instruction can literally be brought to every classroom in the U.S. within a three- or four-year span."

The ECS approach to teaching grammar school children with an "auto-instruction system" employs a variety of terminals connected to a Honeywell 316 located either in or near a school. The cost per student to an educational agency is almost identical for both small and large schools or districts, Fox said. ECS' yearly systems costs start at \$25/student, depending on the extent of curricula implementation.

"Cost guidelines established during the development and validation of the mathematics drill and practice show that this amount is what local education agencies can justify for implementing a computer-assisted instruction system," Fox said. "The system is designed to handle a math curriculum for students in grades one to six and an elementary English program developed by Harcourt Brace and World, Inc., for grades four to six. ECS plans to expand its system with spelling and reading programs."

Three Considerations

"Three considerations were made in designing our system. The first was to group similar programs. The second was to reduce costs by combining financial and administrative applications of the school or agency with terminals. The third consideration was to build in a high degree of flexibility in the system so that additional equipment could be added at a future date," he added.

N.Y. Education Dept. Installs CDC 3300

ALBANY, N.Y. — The New York State Education Dept. has installed a Control Data 3300 at its headquarters to handle a variety of business and scientific applications.

The CDC 3300 centralizes information processing for an on-line, interlibrary book loan network; provides management information from a data bank on secondary schools; and processes data on a variety of scholarship, licensing and school aid programs involving all educational institutions in New York State.

Multi-programming capability provided the department through Master (Multiple Access Shared Time Executive Routine), a software system designed to simultaneously process more than one program.

License Changes in Florida

MIAMI — Starting July 1, Florida license renewal will be handled by mail through a central Florida Highway Patrol office in Tallahassee.

The system will put a computer in charge of keeping tabs on the state's drivers.

SCORE



ANCHOR HOCKING
CORPORATION

Mr. Robert F. Weil
Vice President-Marketing
Atlantic Software, Inc.
1000 Peachtree Street
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Dear Bob:

SCORE has done it again!

After a very careful analysis of SCORE and a direct comparison with IBM's COBOL and RPG languages, we are convinced of the tremendous advantages SCORE will provide our Anchor Hocking system development efforts.

Using a very controlled environment, we have taken four actual program requests from our backlog of work, and coded, keypunched, compiled, tested and run them on the SCORE system. The results are impressive. The language SCORE is our primary language, while RPG's use is limited.

The results clearly demonstrated that SCORE can provide outstanding time and dollar savings over COBOL and RPG. A brief summary of the results of our analysis is shown below:

	RPG	COBOL	SCORE
Programming	11.9	9.1	.5
Keypunching	4.1	7.2	.5
Computer Time	1.5	3.2	.5
Total Work	17.5	31.4	.5

SCORE'S PERFORMANCE RATIO IS 5 TO 1 OVER COBOL.

We have taken these performance ratios and used them to calculate what would be the savings in time and money in 1970. The savings are double the price of SCORE alone.

SCORE will be used as a tool to accelerate IBM and 16-bit conversion efforts. It will also help us to respond more promptly. It will also be a great help for our new systems development projects. We have generated a COBOL source program.

You've got a winner in SCORE, and here at Anchor Hocking SCORE will help to make us a winner, too.

Yours very truly,

ANCHOR HOCKING CORPORATION

Robert F. Weil
Director, Management Information Services

Programming Methods Inc.

Atlantic Software Inc.



I plan to attend the seminar in _____
Send details and literature on SCORE
Name _____
Title _____
Company _____
Street _____
City, State, Zip _____
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McDonnell Automation Installs 360/85

McDonnell Automation Co., St. Louis, has installed a \$12 million IBM 360/85, said to be one of the most powerful systems manufactured for use by a computer utility providing DP services. The Model 85 has a four-million character memory and a storage capacity of 1.7 billion characters.

Italian Bank Groups Order GE-600 Series

Special to Computerworld
ROME — Orders for GE-600 series computers have been received by GE Information Systems Italia (Geis) from banking organizations in Milan and Rome. This brings the total sales of the 600 series in Europe to over 20, others having been sold in the UK, France, Germany, Switzerland, West Germany, and Italy.

The largest Italian bank, the Banca Nazionale del Lavoro (Banca Nazionale del Lavoro), of Rome, Services to be undertaken include management operations, such as pensions and check processing, which the bank handles for national insurance and other clients.

ever received by Geist, and complements a previous order from the bank for four GE-425s.

Real-Time System

The new systems are to be built with the four existing computers to extend a real time system — now under development and intended eventually to link all 200 of the bank's branches (throughout Italy) to the central system. The new systems will allow a real-time control of counter operations and will also be used for a variety of batch processing func-

tions. Each will have a 128K (36-bit words) main memory, backed by a 1.7 million character random access memory.

Society Italiana per l'Elaborazione (Sipe) has ordered a GE-615 system, with which it intends to conduct bureaus activities on behalf of its current shareholders, the Banca Nazionale del Lavoro, of Rome, Services to be undertaken include management operations, such as pensions and check processing, which the bank handles for national insurance and other clients.

London University to Get CDC 6400 Early Next Year

Special to Computerworld

LONDON — The University of London hopes to increase its penetration into the computing market with the installation of a CDC 6400 at its Bloomsbury, London center early next year.

A new conversational service based on the new 98K system is to be introduced to complement, but not replace, a conventional batch processing entry facility, offered on the university's six-year-old ICL Atlas 1.

Both services are currently intended to exploit the commercial possibilities of software developed within the university — much of which would otherwise be lost within the framework of academic administration.

This practice has previously been adopted in marketing Atlas time and services, but has not been widely accepted by British universities although it is quite common within the American academic circles, according to Gordon, managing director of the subsidiary, Randax Ltd., which operates the commercial services. Unlike Atlas, the purchase of which was partially subsidized, the CDC computer will be entirely devoted to com-

mercial activities.

Atlas has been, and will continue to be, operated by the commercial subsidiary, but has 25% of its time dedicated to university work. The need to charge while helping to pay the university will still be used to exploit software developed within the university — which now includes a CDC 6600 and two CDC 6400 satellites among its computing facilities. (Other machines operated for academic/research purposes by the university include an IBM 360/65, an ICL 1905E, other smaller machines, and the Atlas.)

Announces Name Change

Simultaneously with the announcement of the order for the 6400, the commercial subsidiary company has announced a change of name — from University of London Atlas Computing Service to London University Computing Services Ltd. Under the new name, the company will continue to offer mainly scientific and number-crunching computations, passing any purely commercial work to a commercial bureau, Randax EDP Ltd., with which it has a marketing agreement.

Beckman Instruments Establishes Advisory Automation Products Unit

FULLERTON, Calif. — Beckman Instruments, Inc., producer of precision measurement instruments and electronic components, has formed the Automation Products Activity. The formation of this separate group signals the development of additional capabilities in the field of computerized instrumentation data handling and analysis.

Automation Products is to be managed by Dr. Richard A. Nesbit, who will function actively in three specific areas of interest:

1. Beckman will operate as a corporate engineering advisory group to all company divisions on matters involving the automation of those divisions' products.

Data Reduction

The group will develop specialized data reduction systems built around both small digital computers, and commercial time-sharing computers. The intent, for the most part, be geared directly to analyses in one of three environments: research, production, and clinical laboratories.

The new activity will develop and market a line of terminal equipment designed for operating these programs.

Automation Products will be responsible for the development of software programs for the computerized control of processes in specific industries.

Consultant Firm Opens N.Y. Office

LONDON — A solution to many computer problems, whether they be temporary overloads, shelfed systems through lack of personnel, or projects too expensive to develop, may be provided by Computer Complement International, a consulting concern now opening a New York office. The company said it is able to undertake computer work at close to half the current U.S. rates.

Computer Complement's international charge is \$1,750 per programming month, which includes "the full range of services, and knowledge of the entire British computer industry," according to the company.

Totally independent of any manufacturer, financier, or computer concern, the company said it can select the most suitable company to undertake a particular project.

COMPUTING CENTER SITE Ideal for Regional Operation

New Haven — Bridgeport Corridor Immediate occupancy, 7000 square feet. Designed and constructed as a computing facility. New building, excellent location.

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COMPUTERWORLD 1970

Announces A Special Report in the July 1st Issue "Communications and Terminals"

This Special Supplement will be devoted to the fast growing Terminal market of the industry.

If you have products and services devoted to this Communications and Terminal market, this Supplement is your opportunity to advertise in an exclusive environment.

Issue Date — July 1st

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Wanna see it again?

digital

International Computer Moves to Marlboro

MARLBORO, Mass. — International Computer Terminals Corp., designer and manufacturer of computer display terminals which "think for themselves," has relocated its research headquarters and manufacturing facilities in the Industrial Park here, announced Jean Tariot, company president.

The SPD 10/20 (stored program display) is the first product of the organization formed in February, 1969. First production units will be delivered this summer.

Two cofounders, Jean Tariot and James Upton, were members of the Raytheon "Dids-400" commercial displays program. Tariot assumed responsibility for the Dids operation in 1965.

Upton, the executive vice-president, was responsible for the original concept and development of the Raytheon commercial data terminal. Subsequently he managed several major airline reservations programs within the commercial display

business area.

The SPD 10/20 is reportedly a new concept in alphanumeric display devices,

Sylvania Tests Mobile DP System to Maintain Current Military Personnel, Supply Records

NEEDHAM, Mass. — A mobile DP system which keeps up-to-date records of military personnel, supplies, and equipment maintenance status is being tested here by Sylvania Electric Products Inc., a subsidiary of General Telephone & Electronics Corp.

Designed for the Army, the system includes an IBM 360/40, a mass memory, and maintenance and support trailers. It will be comparable in four 35-ft-long highway trailers.

Sylvania installed and is testing the DP equipment in the specially designed vans under a contract from IBM, prime con-

tractor for the Army project. Total System acquisition date on the program is about \$4.8 million.

A running account of the supply such as stock, truck, and vehicle count and deployment will be provided. An operational date for the system has not yet been determined, according to an IBM spokesman.

All vehicles are equipped with air suspension systems for travel over rough terrain, thereby permitting the Army to use ruggedized existing commercial equipment rather than design new computers.

Trade Shorts

RCA's Computer Systems Division has opened a new sales office in Pittsford, N.Y., to market and service Spectra 70 systems. Ralph E. Butt, district manager, said the new office will cover Rochester and surrounding Monroe County. An upstate N.Y. branch was opened earlier in Albany.

MAI Equipment Corp. has increased its rental charges for IBM-manufactured unit record equipment and on maintenance agreement charges effective August 1.

The new rental rates remain below IBM's recently increased rates for comparable equipment, according to Joseph Barsa, MAI vice-president.

No change in rental rates for tabulators and calculators have not been increased while MAI has reduced its rental rates for long-term leases with respect to type 407 tabulators. Purchase prices on all unit record equipment remain unchanged.

Transamerica Computer Co., San Francisco, will provide up to \$12 million to Astronics Inc., Amherst, N.Y., over the next two years to support a portion of the lessening program for Astronics' electronic data sorters. As part of the transaction, Astronics will issue to Transamerica Computer warrants to purchase 250,000 shares of Astronics stock at \$10/share. Transamerica leases computer equipment and provides design and software programs. Astronics manufactures computer-controlled communications systems, peripherals, and precision instrumentation.

Vanguard Data Systems, Irvine, Calif., and SRC Data Products Inc., Montgomeryville, Pa., have announced a five-year distribution agreement to the Datascaler line of key-to-tape systems made by Vanguard.

Data Network Corp., New York, has changed its name to Mesa Systems Inc. to "better reflect our increased diversification due to our recent merger with Data Network Systems Inc." Mesa is now able to market a wider range of services and to establish a nationwide computer services organization. Mesa Systems offers specialized proprietary software applications, time-sharing service, and support service.

Ridall Associates Inc., Paoli, Pa., has opened its principal office in Station Square Two following a move from original quarters in Pennsport, N.J. Mesa Systems of Data Systems Analysis Inc., Pennsport, Ridall Associates will continue to offer services in management studies and information systems; business, product, and market planning and evaluation; and information storage and retrieval systems.

Com-Share Inc., Ann Arbor, Mich., has agreed with Com-Share (Canada) Ltd., Toronto, and Polymer Corp., Ontario, to expand the Com-Share time-sharing system into European markets.

Graham Magnetics Inc., Graham, Texas, a manufacturer of computer tape, has formed an international division based in Paramus, N.J., to handle orders the company is filling for foreign companies.

Traceor Computing Corp. (TCC) Austin, Texas, has agreed with Computer General Corp., a division of TCC, to provide increased throughput capability at its Washington, D.C. branch office by the use of PowerPak, an operation system supplement developed by CGC. PowerPak offers a substantially increased throughput capability on IBM 360s when run with the DOS operating system on the Power II spooling package.

Alphamedic Data Corp., Cranbury, N.J., a manufacturer of peripheral equipment, has been renamed Alphamedic Inc. since the new name is "easier to use and less confusing."

VENDERE needs professional marketing representatives

...to sell user-oriented hardware and software products in regions served by the following district offices:

NEW YORK, CHICAGO, LOS ANGELES, WASHINGTON, D.C. and HOUSTON.

In addition to the areas served by the current district offices, Vendere has opportunities for marketing representatives in Boston, Philadelphia, Atlanta, St. Louis, Cleveland, Denver, San Francisco and many other cities.

Vendere's charter is to offer user-oriented, cost-effective, performance-proven products and services to computer hardware and software users. Examples of the products offered by Vendere are:

OWICK GWERY—a hardware independent file retrieval system

COMPUTER INPUT CORP.—high-performance, low-cost keypunching service

PRECISION PUBLICATIONS—hardware and software technical documentation

1130/ACCESS—software compatible 2311 capability for the 1130

RELOCATE—a DOS system enhancement for multiprogramming users

DYL-250 Program Eliminator—computer installation management and data base tool for the non-programmer

DYL-255 COMPRESS—reduces tape and disk file storage requirements and processing time

FLEET MAINTENANCE COST CONTROL—a maintenance accounting system for all fleet vehicle operators

Vendere offers to technically qualified computer marketing personnel with hardware or software sales backgrounds and a college degree or equivalent experience:

Unlimited incentive earnings

Good base salary

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Excellent fringe benefits

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Informatics Makes Long a VP, Treasurer

SHERMAN OAKS, Calif. — Cari D. Long has been elected vice-president of finance and treasurer of Informatics Inc., Sherman Oaks, Calif. Long has been in the corporate finance field for over 14 years. He received his B.S. degree in business administration from Austin Peay State College, Clarksville, Tenn., in 1956.

After graduation he joined GE's business training program. He then held various supervisory positions and was named manager of general accounting for appliances and distribution in Washington, D.C.

In 1964, he joined the Starray Corp., Inc., as assistant controller, and was promoted to controller in 1966.

Long is a certified public accountant in Illinois and a member of the American Institute of Certified Public Accountants.

Other Moves

■ Paul Notar will join Masco Systems Group, Inc. as vice-president of education.

■ Graco, Inc. has named Charles F. Murphy, vice-president, research and engineering, and John S. Donnelly, vice-president, operations.

■ Eugene L. Baker has been promoted to vice-president of administration and personnel of Control Data Europe.

■ Lee D. Galaher has been named vice-president of Datatab-Chicago, Inc., a wholly owned subsidiary of Datatab, Inc.

■ Henry Chauncy, president of Educational Testing Service, Princeton, N.J., since 1948, has been elected president of Education.com.

■ Jack R. Lohrey has joined Information Management Inc. as vice-president and director of marketing.

■ Robert D. Jacobs, formerly vice-president of marketing services for UCC, has been named president of Academy Computing Corp.

■ John C. Stetson has been elected president of A.B. Dick Co., Chicago.

■ W.R. Meisinger has been

made vice-president and general manager of Pinelites, Inc., Fairfield, N.J.

■ Clifford K. Johnson has been elected president of American Biomedical Corp. Johnson was executive vice-president of its computer subsidiary Management Systems Corp. for the past year.

■ Gary B. Friedman has been elected vice-president, engineering, and secretary of Electronic Graphics, Inc., Garland, Texas. The firm specializes in computerized design of electronic printed circuit boards.

■ Jack H. Flaschbart has been named vice-president of Ticket Reservation Systems, Inc. Flaschbart was recently with Royalmail Corp., where he also served as vice-president of finance.

■ Berglund Associates, Inc., a subsidiary of Eastern Data Industries, Inc., has named Christopher Buff as vice-president of European operations. He will direct Berglund Associates' technical and management consulting services for both U.S. and European clients from Zug, Switzerland.

■ Norman H. Bolstad has joined Inventory Management Systems, Inc. (IMS), as vice-president of marketing. Bolstad was president of a chain of markets before joining IMS.

■ Professional Data Processing Services, Inc. has promoted Ronald E. Hogan to executive vice-president and George A. Sieg to vice-president.

■ Alan C. Everest has been elected executive vice-president, secretary-treasurer and a director of Computer Systems Management Inc., Dallas, Texas.

■ Robert L. Jones is now vice-president, marketing, at On Line Computer Corp., Stamford, Conn.

■ Charles W. Canon has been named a vice-president of Data Computer Systems, Inc., Santa Ana, Calif.

■ E.P.G. Computer Services, Inc. has elected Edwin L. Schmidt, corporate vice-president and general manager of the Business and Industry Division of the Bunker-Ramo Corp.

■ William B. Stancliffe has been elected a vice-president of Marine Midland Services Corp., El Segundo, Calif.

■ T. Matthew Sloan has been elected president of Compute America Corp., Oklahoma City, Okla.

■ Martin A. Spar has appointed Martin A. Spar as vice-president of the Information Systems & Services Division, subject to the approval of the New York Stock Exchange.

■ John McKeown has been ap-

pointed vice-president and general manager of Canoga Electronics Corp.

■ Computer Syntexes, Inc., has named Dr. E. David Crockett as vice-president and director of engineering.

■ Ted R. Willis has been elected vice-president, engineering, and secretary of Electronic Graphics, Inc., Garland, Texas. The firm specializes in computerized design of electronic printed circuit boards.

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■ John McKeown has been ap-

Executive Corner

ed senior vice-president of Casynikan, Inc.

■ Edward J. Shughnessy has been named marketing vice-president of Computer Optics, Inc.

■ Robert O. Doherty has been named vice-president, marketing, for Automated Information Systems, Inc., Wellesley, Mass.

■ Peter F. Keating has joined Kennedy Computer Institute Inc. as vice-president in charge of corporate growth and development.

■ Georges Collet has been named executive vice-president of Complex Systems, Inc.

■ Robert A. Gavert has been named vice-president, administration, by Dataflow Business Machines Corp., El Segundo, Calif.

■ T. Matthew Sloan has been elected president of Compute America Corp., Oklahoma City, Okla.

■ William B. Stancliffe has been elected a vice-president of Marine Midland Services Corp., El Segundo, Calif.

■ Eastman Dillon, Union Securities & Co. has appointed Martin A. Spar as vice-president of the Information Systems & Services Division, subject to the approval of the New York Stock Exchange.

■ John McKeown has been ap-

User Update

Gulf Oil Corp. has appointed three datacenter managers under its computation and communications services department. They are: E.H. Hartung, W.E. Allison, and B.W. Root.

Alan G. Smith has been named senior consultant and project director by International Data Corp. of Newton, Mass.

Thomas A. Schaeffer, former computer applications specialist, has been appointed director of the computer center at Millersville State College, Pa.

Berkeley A. Tague has been promoted to head of the computer planning department at Bell Telephone Laboratories, Murray Hill, N.J.

Robert A. Smalls, manager of the Information Services Division of Stone & Webster Management Consultants, Inc. has been elected a vice-president of the firm.

Wayne Frankhauser, manager of data processing and systems at Alberto-Culver Co., has been promoted to director of information systems.

Charles D. Barkwill Jr. has been appointed marketing research and manpower development manager of A.B. Dick Co.

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LIFE & CASUALTY

Hazeltine Display System Used to Track Satellites

LITTLE NECK, N.Y. — Hazelton Corp. has installed a computer-driven display system utilizing digital television techniques at NASA's Goddard Space Flight Center in Maryland. The NASA Space Tracking and Data Acquisition Network (Stadan) operation control center office said: "The display system will be used for more effectively handling the scheduling and rescheduling of all tracking, telemetry and command operations by NASA Stadan which presently tracks more than 40 spacecraft."

The Hazeltine system, designated Model DDG-3, is a major part of the system which stores and displays on TV monitors determination data on every manned satellite in orbit and

stores data for all NASA remote stations. This information is necessary to support scientific experiments or to communicate with any satellite.

The Model DDG-3 display system accepts digital data from an IBM 360/95 computer and from operation data entry keyboards, query panels and light pens and produces 20 different alphanumeric and graphic displays, some at remote locations. A repertory of 256 characters, all programmable in size and font, is included.

Hazeltine digital television systems are in operation at Cape Kennedy and will soon be implemented at the Mission Control Center, Houston.

COMPUTERWORLD

Orders and Installations

International Computers Limited (ICL) System 470 computers have been ordered by two separate local authorities in London, England, England. One order is from the London Boroughs Joint Computer Committee which represents the computer interests of the London boroughs of Bexley, Greenwich, and Southwark. The second 470 will form the center of a new computer system for the City of Coventry. British Rail has ordered two ICL 19044 computers for centers at Crewe and Peterborough to add to the previously installed ICL 1906 computers.

Redman Heenan Fronde, a Worcester, England, engineering company, has ordered a mini-

computing system from Honeywell Ltd. that will log, analyze, and plot up to 900 different parameters. The individual tests applied to its engineering products. The H316 system is valued at \$43,000.

Webster Computer Corp., Danbury, Conn., has received eight orders for its DOS machine utilization reporting systems. The orders are from Black & Decker, Md.; Brown Bros. Harriman & Co., N.Y.; Cigna Corp., N.Y.; Wachovia Bank & Trust Co., N.C.; Pest Marwick Mitchell & Co.; Sunset House, Calif.; Travemol Laboratories, Inc., Ill.; Chubb & Son, Inc., N.J.

Management Research International Inc., Atlanta, Ga., has ordered a \$2.6 million CDC 1404 system, equipped with CDC's Kronos time-sharing system, to expand the firm's information service business.

Atlantic Software Inc., Philadelphia, Pa., and Programming Methods Inc., New York City, have placed a \$1.5 million order for the Score Cobol program generator/information retrieval and reporting system: Anchor Hocking Corp., Lancaster, Ohio; Burlington House, Burlington, N.C.; U.S. Department of Housing and Urban Development, Washington, D.C.; Mohawk Duck Souvenirs, Herkimer, N.Y.; Remington Arms, Bridgeport, Conn., and the School District of Philadelphia, Pa.

Shell Mex and B.P. Group, a British oil marketing company, has ordered a Univac 1106 to augment a Univac 1108 system which the company currently uses. The Univac 1106 will have a 196,000 word main memory, 262 million characters of random access storage, 12 magnetic tape units, two high-speed printers, two paper tape readers, and a Univac 9300 computer system. The British company also ordered Univac 9300 systems: Cominsprint, and the Banks-town Municipal Council, both of Australia; Maruei Department Store, and Tsubakimoto-kogyo Co., both of Japan; and Satellite Computer and Communications Systems, Ltd., of Hanover, Ont.

Pennsylvania National Mutual Casualty Insurance Co. of Harrisburg, Pa., and the Data Center Division of Leaseway Transportation Corp., Cleveland, Ohio, have ordered Burroughs B3500s. The insurance company uses the system for general

ledger and cost accounting systems, external audit internal statistical requirements, and policy analysis and rating. The Data Center Division of Leaseway Transportation Corp. will be used for financial, equipment and statistical records.

Univac has received several recent orders and installations for its 9000 series computer systems. Brotherhood Mutual Insurance Co., Fort Wayne, Ind., installed a Univac 9211 system at its headquarters in Philadelphia, Pa. The following companies have ordered 9200s: The Federal Land Bank of Houston, Selmore Windrow Manufacturing Co., Buffalo, N.Y.; McArthur Dairy of Florida; Southwest Green & Oil Co., Wichita, Kan.; Friends University, Wichita, Kan.; The Paterson NJ Board of Education; Kirkhill Inc. of Los Angeles; and Youthcraft Coats and Suits Inc., Kansas City, Mo.

An International Computers Limited 1902A computer and a number of visual display units have been ordered by the Government of Fiji. The 1902A will be installed at the central post office, Suva, and will perform a wide range of statistical, accounting, and controlling applications. ICL 1904A computers have been ordered by two mining companies, Mount Isa Mines in Australia, and the Boliden Co. of Stockholm, Sweden.

Ampex Corp. of Culver City, Calif., delivered components to Marconi Computer Systems Ltd. of Great Britain under a \$1.3 million contract. Ampex has also begun delivery of core memory stacks under a \$1 million contract from Data General Corp.

Carte Blanche has ordered a RCA Spectra 70/55 computer to handle its increasing accounting and billing load. The \$1.6 million new system will replace two second generation computers at the company's international headquarters in Los Angeles.

International Communications Corp. (ICC) of Miami, Fla., has placed an order with Pan American Airlines' ICC's International Communications Dept., Racal-Milgo Ltd. of England. The Lufthansa order includes more than \$750,000 in high-speed modems to provide the data transmission links for Lufthansa's international seat reservation system.

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MATHEMATICAL-STATISTICAL PROGRAMMERS

Required experience: Commercial financial data processing in FORTRAN or ALGOL; degree, mathematics or statistics. Desired experience: design and implementation of programs and models for conversational end-user shared use.

SYSTEM SUPPORT ANALYSTS AND PROGRAMMERS

Creativity, self-sufficiency and orientation to both hardware and software are prime essentials, as well as ability to serve as liaison between vendors and application programmers. Required experience: minimum 2-3 years in 82000-85000-86000 or 5/280 operating systems; compilers and applications support software for system maintenance and development of disk management software and conversational programming; 2-3 years in assembly language programming; knowledge of ALGOL and COBOL or ALC/BAL languages. Desired: degree and supervisory experience.

DATA COMMUNICATIONS SUPPORT ANALYSTS AND PROGRAMMERS

Required experience: total communications installations, network design, terminal analysis; systems analysis and implementation of local communications processors; minimum 2-3 years in hardware and software, using advanced languages and operating systems. College degree, supervisory experience and ability to represent bank in nationwide communication system are essential.

TRAINING ANALYSTS

Degree, professional teaching experience, technical writing, fair and ability to coordinate Division education projects are key requisites. Required experience: developing and conducting disk processing training programs and classroom training systems and programming background.

STANDARDS ANALYSTS

Required experience: degree plus systems analysis and programming, using advanced languages and third generation software systems; developing and implementing data processing standards for documentation, analysis, programming, operation and production control; involvement in production operations.

Contracts

Systems and Software Corp., Tampa, Fla., has received a contract from Seald-Sweet Growers, Inc. to convert a fully manual record system into a data processing system that uses on-premises terminal computers with real-time access to the computing power of a central processor.

Baldwin's Reports Inc., Weller, Ill., Mass., has awarded a contract to John D. Hurley Inc. to install a computer to update the portfolios of its clients, perform accounting functions, and perform comparative analyses for research department.

General Services Administration has contracted Wang Laboratories, Inc. for a potential value of \$4,455,000 if the federal agencies purchase according to previously indicated requirements.

Computer Sciences Corp. has received a contract valued at more than \$1 million from the Nevada Operations Office of the Atomic Energy Commission. The contract calls for Environmental Research, an operating unit of CSC, to continue to provide the NEON Nevada Operations Office with predictions of the ground motion to be anticipated from the government's underground nuclear testing program.

Hazleton Corp., Little Neck, N.Y., has received a letter contract from the Air Force Aeromedical Systems Division for the production of AN/APA-6401 data link transponders. The contract is valued at a maximum obligation of \$500,000.

Viatron Computer Systems Corp. has signed a \$1.25 million contract with Motorola Inc. to purchase solid state video disc player units.

Visual Electronics Corp. has been contracted by the Cam-

bridge Electron Accelerator Center for the purchase of four 55 kw amplifiers to be combined for use in high-energy physics studies. The program is being financed by the Atomic Energy Commission. The accelerator facility is jointly operated by MIT and Harvard.

Maxon Electronics Corp. has received a \$5,069,000 contract from the U.S. Army Maintenance Command, Edgewood Arsenal, Md., for the production of XM-74 rockets. Under the contract the U.S. Army also has the option to purchase up to 50% more XM-74 rockets.

A third contract to provide computer software services is service to the U.S. Office of Education by a consortium of Infodata Systems, Inc., Webster, N.Y. The contract, for \$30,000, calls for Infodata to maintain, produce, control, and schedule services for the Office of Education Interim accounting systems.

Instrument Services Corp. has received six additional contracts totaling \$500,000 to provide passenger seat control units for the aircraft entertainment and service system of six airlines which are purchasing Boeing 747s.

Computer Entry Systems Corp., Silver Spring, Md., has entered into a long-term OEM agreement with Data Printer Corp., Cambridge, Mass., to purchase its fully buffered medium-line printers.

C3, Inc.'s Detroit Branch has been awarded a contract by Federal-Mogul Corp. for the system design and implementation of an Service Inventory Management-Parts Locator System (SIMPLS). The system will use CRTs on-line for inventory control at F-M's Coldwater warehouse facility.

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May 20, 1970

Page 49

Poor First Quarter Showing**Norris Foresees Substantial Drop in CDC Earnings****Special to Computerworld**

ST. PAUL, Minn. — President William C. Norris had little good news on prospects of earnings improvement during fiscal 1970 at the company's annual shareholders' meeting. He said earnings would be "off substantially" from 1969, although the final two quarters of the year should show sales improvements in large-scale computers.

Norris also confirmed an information leak in a trade journal from a government source that Control Data will deliver its first super-scale Star computer in late April. Lawrence Kadlak, president of the company's laboratory division, was not present for the meeting. He said his comments would be "off substantially" from 1969, although the final two quarters of the year should show sales improvements in large-scale computers.

Norris also confirmed an information leak in a trade journal from a government source that Control Data will deliver its first super-scale Star computer in late April. Lawrence Kadlak, president of the company's laboratory division, was not present for the meeting. He said his comments would be "off substantially" from 1969, although the final two quarters of the year should show sales improvements in large-scale computers.

The Bloomington, Minn., based computer maker had a poor first quarter this year when earnings plunged to \$1,678,000 or 9 cents a share from \$1,657,200,

or \$1.13 a share in the comparable period of 1969.

Declining sales of large computers to the government and aerospace industry are responsible for the earnings downturn, Norris said. He said the common stock dividend will be omitted until earnings improve.

Norris said the 1971 earnings picture will depend on the condition of the economy, which he

said is too uncertain to predict at the current time.

Control Data will increase its technical spending this year by \$20 million to \$170 million. About 60% of the spending or \$10.2 million will be used for developing new products and improving existing ones, according to Norris.

The president emphasized that the company will continue its current strategy of concentrating on large computer systems with support units for medium and small-sized computers.

"Medium-size and smaller computers are very important to Control Data, especially in the role of supporting large computers... The demand for our smaller computers continues to be relatively good although there has been some softening over previous months," said Norris.

Peripheral Equipment

The bright spots of the company's current condition are sales of peripheral equipment to other manufacturers and the growth of customer engineering services.

Norris expects peripheral equipment sales to exceed 1970 forecasts during 1971 although profits are down due to competitive price pressure.

He predicted that the company's Cybernet Data Service Centers will become profitable on a worldwide basis in 1970.

"It has become apparent, however, that some of our principal established business are reaching maturity and that a continuation of RCA's growth and profit momentum can best be assured by creating new business opportunities.

The company has invested more than \$50 million in Cybernet.

Control Data's takeover of Commercial Credit Co. in 1968 is paying dividends to the firm as a source of earnings, Norris reported.

"Commercial credit was faced in 1969 with greatly increased competition which it successfully used to meet the challenge. Nevertheless, it has achieved a more profitable operation than in 1968 and appears headed for a good year in 1970," said Norris.

During the last year, Norris said, Commercial Credit completed plans to finance all of Control Data's short-term partner leases and to introduce a new long-term computer lease

arrangement.

Although the company expects an unprofitable year from its computer business, Commercial Credit is expected to better its 1969 earnings of \$34,655,658. Cost cutting and corporate reorganization are being initiated to improve the company's efficiency in troubled economic circumstances, Norris said.

Plans Closed

The company has closed assembly facilities in Farmington, Mich., where more than 200 were employed, and at Melville, N.Y., where 190 were employed. Some of the Melville employees were transferred to other plants.

"In my judgment we have not only sacrificed the future with our cutbacks even though we have some good things in marketing, research and development, and other areas which go somewhat farther than those reported in the annual report," said Norris.

The company reorganization resulted in the creation of a four-member executive committee led by W.R. Keys, executive vice-president. Also members are Norris, R.D. Schmidt, senior vice-president, and H.H. Hammer, vice-president.

Members of the executive committee "have divorced themselves from operational tasks and now devote full time to the top managerial activities of the corporate office," said Norris.

Norris also announced that the company's 7600 series of large computers should be ready for initial shipments to customers during the second half of 1970. The 7600 has been developed over an eight-year period at a cost of \$60 million.

The company's large-computer strategy will be focused this year on the hospital-medical market. It is intended to emphasize the marketing of this company's "fractional capacity blocks." A new data service called Cyberpark will offer discounts to customers guaranteeing high-volume use.

"Under the fractional computer plan, the customer can utilize his allotted time on the computer by taking it over with new employees, or he can buy the time. Control Data will furnish the operating people as well as the computing power," said Norris.

RCA Domestic Shipments Nearly Double; Sarnoff Cites Emphasis on Computers

NEW YORK — RCA plans to become the other computer company.

Speaking to shareholders at the company's recent annual meeting, RCA Chairman Robert W. Sarnoff said that if the industry patterned after the company's, the company's scheduled deliveries this year should move RCA from fifth largest mainframe manufacturer, as it was last year, to number two, behind IBM.

Sarnoff said that domestic shipments of computers nearly doubled in the first quarter of 1970. RCA's schedule of domestic shipments this year will account for slightly more than 7% of the projected industry total, he noted, as against 3.7% in 1969.

He added that no company other than IBM has achieved such a high share of the market during the past five years. As a

further indication of growth, he cited a threefold increase in the number of new computer accounts obtained by RCA in the first quarter of 1970.

In a discussion of recent business trends, he said that RCA's earnings for the first quarter were depressed by a number of adverse factors, including a decline in consumer buying intent, tight money, and a consistent rise in the costs of doing business.

"The economic climate presented many difficulties, but hopefully, it will improve as interest rates fall, social security payments rise, and the surtax is removed," he said. "If so, we can anticipate a modest return of consumer confidence and increased spending, with most of the impact beginning to be felt in the late year."

Less Vulnerable
Sarnoff told the shareholders

that RCA is undergoing basic changes in order to give greater emphasis to its growing computer business and its diversified services.

He said RCA should be less vulnerable to fluctuations in the economy as it develops a wider and more balanced range of activities, pointing out that it has already moved a long way toward becoming a fundamentally different company.

"Until recently," he said, "our business had been largely oriented toward the consumer products market. It derived the major financial part of its sales and profit from the area of electronic home entertainment instruments and from radio and television broadcasting..."

"It has become apparent, however, that some of our principal established business are reaching maturity and that a continuation of RCA's growth and profit momentum can best be assured by creating new business opportunities.

"Broadcasting and color television manufacturing should continue to generate substantial volume and profit years to come, but the era of their most vigorous expansion has passed."

"Broadcasting and color television manufacturing should continue to generate substantial volume and profit years to come, but the era of their most vigorous expansion has passed."

Sarnoff said that the 1970s will bring growing worldwide need for computer systems to gather, communicate, and process information for all uses, and he added that there will also be an accelerating demand for new and diversified services for a society with more leisure time.

"It is our goal, and we are well on our way to its attainment, to expand our R&D program, a national industrial enterprise doing business principally in computer-based information systems and diversified consumer and professional services," he said. "While we intend to maintain a leading position in the consumer electronic products market, we expect this activity ultimately to account for a lesser share of RCA's total volume and profit."

He noted that RCA's new structure reflects the greater complexity that has been added to its capabilities as a system-oriented company and to its growing computer business.

The bright spots of the company's current condition are sales of peripheral equipment to other manufacturers and the growth of customer engineering services.

Norris expects peripheral equipment sales to exceed 1970 forecasts during 1971 although profits are down due to competitive price pressure.

He predicted that the company's Cybernet Data Service Centers will become profitable on a worldwide basis in 1970.

"It has become apparent, however, that some of our principal established business are reaching maturity and that a continuation of RCA's growth and profit momentum can best be assured by creating new business opportunities.

The company has invested more than \$50 million in Cybernet.

Control Data's takeover of Commercial Credit Co. in 1968 is paying dividends to the firm as a source of earnings, Norris reported.

"Commercial credit was faced in 1969 with greatly increased competition which it successfully used to meet the challenge. Nevertheless, it has achieved a more profitable operation than in 1968 and appears headed for a good year in 1970," said Norris.

During the last year, Norris said, Commercial Credit completed plans to finance all of Control Data's short-term partner leases and to introduce a new long-term computer lease

Sperry Rand Revenues, Earnings Hit Record High

NEW YORK — Sperry Rand Corp. has reported record revenues and earnings for the fiscal year ended March 31, 1970. Earnings were \$81,014,000, or \$2.37 per share, compared with \$77,000,000 and 69 cents per share last year. Revenues increased to \$1,755,443,000 from \$1,607,340,000 last year.

Revenues and earnings for the quarter ended March 31 were also the highest ever recorded for the company in the history of the manufacturer of computers, office equipment, electronic hydraulics, farm equipment, and consumer products. In that quarter, earnings were \$24,281,000, or 71 cents per share, on revenues of \$508,983,000. This compares with earnings of \$21,675,000, or 64 cents per share, in last year's final quarter on revenues of \$445,679,000.

"For the full year, substantial gains in the revenues of the company's Unisys data processing equipment line and continuing high level of sales of Vickers hydraulics and New Holland farm equipment products were the major factors account-

ing for the improvement. Another key factor was a strong overseas market, which accounted for 30% of total worldwide revenues last year," reported J. Frank Forster, president of Sperry Rand.

"Other company operations during the year were comparable to the previous year except for the marine and aerospace segments, which were affected by lower government expenditures and a slowdown in delivery of commercial jetliners, and the company's office equipment segment, which was affected by lengthy strikes in two locations," Forster added.

Based on this record backlog, and the rate of incoming orders in recent months, Forster said that he is optimistic for continued improvement in the company's operations "despite present economic uncertainties."

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He noted that RCA's new structure reflects the greater complexity that has been added to its capabilities as a system-oriented company and to its growing computer business.

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UCC's First Quarter Results Show Increases in Revenues and Net Income

DALLAS — University Computer Co. reported increases in revenues and net income for the first three months of 1970 over the same period last year. UCC net income for the first quarter was \$4,206,000, or 61 cents per share. Revenues amounted to \$37,000,000.

For comparison, net income for the first quarter last year, restated to reflect acquisitions made on a pooling of interest

basis, amounted to \$3,690,000 or restated revenues of \$19,000,000, or 50 cents per share.

UCC's 1970 first quarter results "reflect good increases in revenues in all sectors of the computer utility business," reported UCC President Charles J. Wylie Jr. He noted that "revenues from UCC computing services and products increased appreciably."

More at Stake Than One Company

Make-or-Break Questions Cloud Viatron's Future

By Michael Merritt
CW Staff Writer

You could make lots of money selling low-priced EDP systems to thousands of small businessmen across the country. But at the same time, you would be helping these small businesses, saving them money, and at the same time you would be creating an industry.

Viatron, above all, is concerned with making lots of money. Whether they do it or not is a question of some concern. But more important than the success or failure of one rather small company is the effect their company can have on the thousands of small businesses, and its effect on a valuable potential industry.

Whether Viatron makes it may well determine or indicate the success of any effort to make use of computers as widespread as use of telephones or automobiles.

Some of the Questions

In the last month Viatron has increased its prices, laid off 300 employees, gone out of the rental business, and increased its production rate by an undramatic amount, as well as begun subcontracting terminals to other companies, announced plans for a line of OCR equipment.

These actions all have complicated implications. For Viatron's concept to work there must be volume production; nobody – even at Viatron, probably – is really sure how the price-demand curve moves. And nobody is really sure what effect the price increases will have.

No longer renting is simply making *de jure* a *de facto* situation, since Viatron's policy for the last several months has been to fill sale orders rather than rental agreements.

There are only 400 terminals out on rental, of a total of about 1,500 in the field. This company action, however, merely shifts the burden of carrying rental paper onto the dealers, so that leasing costs are still a factor in the marketing system.

The shift to the dealers though, will certainly have an effect on their attitude toward pushing Viatron.

The layoffs mostly directly affect corporate success. Viatron President Edward Bennett has estimated that, considering overhead, the layoffs will save the company \$8 million a year.

Viatron can't afford cash, and this is one good way to find it – "get out the fat," as Bennett likes to say.

But it is an odd action for a company that should be expanding rapidly, especially in production.

Eight million dollars works out to \$27,214 per person, a rather high wage increase for a company that has a good deal of overhead fat to get out, and the massive layoff shows that the company has kept less than adequate check on its rapid growth.

Introducing new products has disturbed dealers who simply want delivery on the products they have already ordered, and the slow growth of production rates throws a cloud of doubt first on Viatron's ability as a manufacturing rather than a development company, and more importantly on the validity of the concept.

These doubts will, hopefully, be resolved soon by an increased shipping rate, using subcontractors, and black ink on the bottom line, using the lay off savings.

Price Increase

Viatron raised prices on two modules of

the System 21. Most importantly, the Viatron terminal was raised from \$196 to \$384. Almost every terminal is ordered with two of these units, so almost every terminal now costs \$376 more.

In addition, the 2101 microprocessor price was raised to \$1,640 from \$960. These moves alone raise the sale price of the minimal configuration – the "S39 a month terminal" – from \$1,872 to \$3,520.

It also brings the cost of the small microprocessor within less than \$100 of the cost of the 2111 microprocessor, which offers many more features, including improved communications ability.

While Viatron seems to have a way of phasing out the 2101 while still keeping it in the catalog; after all, why should anyone get the 2101 when for only \$88 more . . .

The average unit going out the door before the increases cost about \$4,500, the company claims. The tape increases bring that to \$4,900.

Almost no terminals have been going out with the 2101; it was unprofitable. The price increase won't increase its sales. Any. So what we have in effect is a price increase of about 9% on the average system. And in the short term it won't have any effect on sales. As Bennett says, "I can sell as many terminals as I can make," which is a comment on the company's fantastic file of letters of intent as well as on Viatron's current inability to make really large numbers of terminals.

However, assuming that some time in the future Viatron develops enough production capacity to "walk out" of its backlog, the price increase will have an effect. And by that time Viatron probably will have competition, domestic or Japanese.

There will be, some small businesses, however many, that could save money on a Viatron terminal and lose money on a \$5,000 terminal. Just that many more small people will be frozen out of EDP use.

Lock-Up

Viatron likes to view its market development as a highly interrelated system. The terminal is the entry to the market. From the terminal, users move up to the Viatron

tron minicomputer, which is uniquely suited to handle financial terminals.

The low-priced OCR equipment is the beachhead to the other important aspect of commercial EDP, unit record.

Both the terminal, with its Vistape, and the OCR equipment, with its Viatop, lock the user into a Viatron system, and into the Viatron computer. (The company is called Viatron Computer Systems; for some reason, the computer is a much bigger idea than just selling terminals.)

Interestingly, Bennett estimates that the gross manufacturing profit margin, which about 50% on the terminal, will be 80% on the computer and 90% on the OCR equipment.

It is a good idea for empires, however, because it is so highly interrelated, has forced Viatron to develop new products at a furious pace, much faster than profits can support or normal business prudence would dictate. If Viatron is to become the "industry standard in five years," the company will have to have to move to IBM or nothing else it has ever seen in the computer field, or anywhere else.

You have to lock people in before they have any other choice – ask IBM about that strategy – and if Viatron can't make a roaring success of its high profit items, the dreams of empire will remain just dreams.

So the need for development, for hope, has forced Viatron to slight other aspects of corporate development.

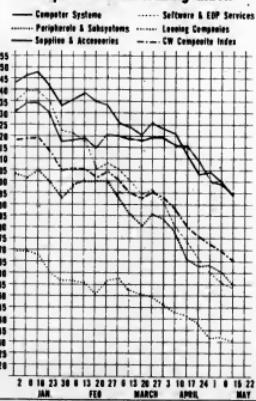
So far Viatron has lost about \$15 million. Because of lagging production, the dealer network is antested, and the dealers are going to be of great importance as Viatron grows. The layoffs indicate that management control is only just beginning to tighten up.

And the need for large amounts of capital has turned management concern toward the financial community rather than toward the user who is going to have to pay for products.

Advertising in *Computerworld* and *Information and Data Processing*, and being written up in *Forbes* and *Business Week* is not the way GM sells cars.

Next time we will talk more about these problems, and in particular about the reactions of some Viatron dealers, and about what may be Viatron's biggest headache, that old catchword, credibility.

Computer Stocks Trading Index



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Computerworld Stock Trading Summary

NEW YORK AND AMERICAN STOCK EXCHANGE CLOSING PRICES, FRIDAY, MAY 15;
OVER THE COUNTER AND NATIONAL STOCK EXCHANGE, THURSDAY, MAY 14

Earnings Reports

COMPUTER PROPERTY CORP.

Three Months Ended Mar. 31
1970 1969
Srv End 3.13 1.11
Revenue 1,081,000 751,000
Earnings 87,000 73,000

ELECTRONIC CONTROLS, INC.

Three Months Ended Mar. 31
1970 1969
Srv End 1.56 0.06
Revenue 347,000 312,000
Earnings 21,000 20,000

DATARAM CORP.

Nine Months Ended Jan. 31
1970 1969
Srv End 8.11 48.38
Revenue 1,571,573 383,996
Earnings 89,252 23,498

a-Loss

STANDARD REGISTER CO.

Three Month Ended Apr. 5
1970 1969
Srv End 5.55 3.64

Revenue 27,632,056 20,701,113
Earnings 1,389,345 1,206,483

a-Three months ended March 30.

UNIVERSITY COMPUTING CO.

Three Months Ended Mar. 31
1970 1969
Srv End 8.61 8.56

Revenue 37,000,000 19,000,000
Earnings 3,700,000 3,700,000

a-Revised for acquisitions made on a pooling-of-interest basis.

COGNITRONICS CORP.

Three Months Ended Mar. 31
1970 1969

Srv End 1.26 1.18
Revenue 8861,488 573,249
Earnings 82,089 86,160

BALTIMORE BUSINESS FORMS

Three Months Ended Mar. 31
1970 1969
Srv End 8.21 8.30

Revenue 4,470,027 4,564,998
Earnings 156,543 21,998

GREYHOUND COMPUTER CORP.

Three Months Ended Mar. 31
1970 1969

Srv End 1.25 1.30
Revenue 12,383,000 11,861,000
Earnings 858,000 1,218,000

BRESNAHAN COMPUTER CORP.

Three Months Ended Mar. 31
1970 1969
Srv End 8.08 8.05

Revenue 1,585,000 682,000
Earnings 1,585,000 78,000

6 Mo Sh -17 -10

Revenue 2,980,000 1,204,000
Earnings 325,000 149,000

SPIERRY RAND CORP.

Year Ended Mar. 31
1970 1969

Srv End 8.27 8.26
Revenue 1,755,443,000 1,607,340,000
Earnings 61,04,000 77,038,000

3 Mo Sh -.71 -.64

Revenue 508,933,000 445,679,000
Earnings 24,281,000 21,675,000

New Registrations

Correction

DYNA DATA SERVICES, INC., 2 West 45th St., New York, N.Y., a company formerly Dynatech Corp., has been renamed Dyna Data, Inc., to provide computer consulting services, including systems analysis, management consulting, and marketing programs, related to the development and marketing of computer systems. Proceeds, at \$5 per share, will be used for the expansion of its operations, including executive salaries. The underwriter is Arnold, Williams & Co., Inc., 39 Broadway, N.Y.

SUPPLIES & ACCESSORIES					
EXCH	RANGE	CLOSING PRICE	WEEK NET CHANGE	WEEK PERCENT CHANGE	EXCH
N	15- 9 10 1/2	ADAMS-MILLIS CORP.	- 5/8 -	+ 5.62	
O	21- 14 16	ALTRONICS BUS FORM	- 1	+ 6.67	
N	21- 16 17 1/2	AMERICAN BUS FORM	- 1 3/8 -	+ 13.20	
A	35- 21 27	DATA DOCUMENTS	- 1 7/8 -	+ 27.78	
N	19- 12 12 5/8	ENNIS BUS. FORMS	- 1/2 -	+ 3.81	
N	16- 17 17 1/2	ENTRANCE CONTROLS/SCORP	- 1	+ 1.74	
N	16- 63 82	EMERSON	- 1 1/4 -	+ 1.55	
N	11- 88 90	EMI CORP.	- 1	+ 4.76	
N	49- 22 25 27	ENRON BUS FORMS	- 1/2 -	+ 1.74	
N	20- 23 23	ENTERPRISE SYSTEMS	- 1/2 -	+ 4.62	
O	41- 31 31 3/2	STANDARD REGISTER	- 1/2 -	+ 4.62	
N	39- 29 25 25 1/2	VARCOP	- 2 1/8 -	+ 7.69	
N	10- 11 11 1/2	WARSH MAGNETICS	- 1	+ 7.59	
O	41- 31 31 3/2	WALLACE BUS FORMS	- 1/4 -	+ 0.79	

COMPUTER SYSTEMS					
EXCH	RANGE	CLOSING PRICE	WEEK NET CHANGE	WEEK PERCENT CHANGE	EXCH
N	172-177 122 1/4	BURROUGHS CORP.	- 2 1/8 -	+ 2.10	
N	37- 16 17	COLLINS RADIO	- 1 1/2 -	+ 8.11	
N	122- 37 51 77 1/2	CONTROL DATA CORP.	- 3 7/8 -	+ 1.76	
N	14- 15 15 1/2	DATA PROCESSING	- 1 1/2 -	+ 4.44	
N	11- 5 5 5/8	ELECTRONIC ASSOC.	- 1/8 -	+ 2.17	
A	14- 6 6 6	ELECTRONIC ENGINEER	- 3/8 -	+ 5.88	
N	27- 22 20 20 3/4	GENERAL AUTOMATION	- 2 1/2 -	+ 2.22	
N	42- 13 16	GENERAL AUTOMATION	- 1/2 -	+ 2.22	
N	45- 31 31 3/4	HEWLETT-PACKARD CO.	- 2 1/8 -	+ 3.67	
N	152-103 106 7/8	HONEYWELL INC	- 8 7/8 -	+ 7.67	
N	88- 56 56	IBM	- 1/2 -	+ 6.64	
N	30- 21 22 1/4	ICRA	- 2 1/8 -	+ 8.72	
N	20- 16 16 1/2	INSTRUMETECH CO.	- 1/2 -	+ 2.33	
N	2- 2 2 1/4	SCI. CONTROL CORP.	- 1/2 -	+ 2.33	
N	40- 24 29	SPIRITUAL MACHINES	- 3/8 -	+ 1.31	
N	29- 15 15 1/2	SYSTEMS LABS.	- 1/2 -	+ 6.18	
N	31- 74 27 27	VARIAN ASSOCIATES	- 1/2 -	+ 8.09	
N	115- 76 80 37 1/2	XEROX CORP.	- 2	+ 2.42	

LEASING COMPANIES					
EXCH	RANGE	CLOSING PRICE	WEEK NET CHANGE	WEEK PERCENT CHANGE	EXCH
O	8- 5 5	BANISTER CONTIN	- 1	+ 16.67	
O	28- 18 18 1/2	BOOTH COMPUTER	- 2 1/2 -	+ 16.67	
O	8- 4 4 1/4	BRESNAHAN COMP.	- 2 1/2 -	+ 5.56	
O	8- 4 4 1/4	COMPUTER EXCHANGE	- 1/2 -	+ 11.11	
O	15- 6 6 6	CYBER-TRONICS	- 1/2 -	+ 6.25	
A	24- 12 12 5/8	DEARDORN COMPUTER	- 1 1/2 -	+ 10.62	
A	22- 9 10 1/2	GRANITE MGT.	- 3 9/8 -	+ 26.36	
A	20- 10 10 1/2	INSTRUMETECH CORP.	- 1/2 -	+ 9.45	
N	30- 11 11 11 1/2	LEASCO DATA PROC.	- 1/2 -	+ 9.45	
A	13- 3 3 3 1/4	LECTRO COMP. LEAS	- 3/8 -	+ 10.74	
A	1- 1 1 1	LEVEL-TONE COMPUTER	- 1/2 -	+ 9.45	
A	1- 1 1 1/2	MANAGEMENT ASSIST	- 1/2 -	+ 5.82	
A	3- 3 3 3	SYSTEMS CAPITAL	- 1/2 -	+ 6.44	
A	18- 12 12 5/8	U.S. LEASING	- 1 1/2 -	+ 10.62	

PERIPHERALS & SUBSYSTEMS					
EXCH	RANGE	CLOSING PRICE	WEEK NET CHANGE	WEEK PERCENT CHANGE	EXCH
N	62- 62 30 3/4	ADDRESSOGRAPH-MULT	- 1/2 -	+ 0.41	
N	48- 17 17 1/2	AMPEX CORP.	- 1/2 -	+ 9.74	
A	34- 8 8 5/8	ASTRODATA	- 1/2 -	+ 15.85	
N	11- 6 7 7	BURGESS & HORN	- 1/2 -	+ 7.41	
N	23- 13 13 1/2	CALCOMP	- 1/2 -	+ 10.27	
O	32- 6 6 6	CALCUTRONICS	- 1/2 -	+ 8.41	
O	36- 16 15 1/2	COMPUTER COMMUN.	- 1/2 -	+ 14.29	
A	28- 17 17 1/2	COMPUTER EQUIPMENT	- 1/2 -	+ 10.00	
O	25- 12 12 1/2	DATA PRODUCTS CORP.	- 1/2 -	+ 3.64	
O	24- 12 12 1/2	DATA TECHNOLOGY	- 1/2 -	+ 10.00	
O	13- 5 5 1/2	DIGITALITICS	- 1/2 -	+ 26.14	
O	40- 15 15 1/2	ELECTRONIC V G	- 1/2 -	+ 12.53	
O	17- 4 4 4	FARNBOROUGH MFG	- 1/2 -	+ 11.11	
A	23- 23 23 1/2	FEDERAL INDUSTRIES	- 1/2 -	+ 16.87	
A	84- 24 24 7/8	HILCO ELECTRONICS	- 1/2 -	+ 10.42	
O	52- 24 24 7/8	OPTICAL SCANNING	- 1/2 -	+ 23.80	
O	17- 6 6 1/2	POTTER INSTRUMENT	- 1/2 -	+ 15.25	
O	25- 12 12 1/2	PRECISION INST.	- 1/2 -	+ 12.22	
O	24- 12 12 1/2	RECOIL CORP.	- 1/2 -	+ 12.22	
N	32- 12 12 1/2	RICOH ASSOCIATES	- 1/2 -	+ 9.26	
N	23- 10 10 1/2	TALLY CORP.	- 1/2 -	+ 22.77	
O	23- 13 13 1/2	TELEX	- 7 7/8 -	+ 14.94	
O	50- 9 9 5 3/4	VIBRATION	- 1/2 -	+ 37.10	

SOFTWARE & EDV SERVICES					
EXCH	RANGE	CLOSING PRICE	WEEK NET CHANGE	WEEK PERCENT CHANGE	EXCH
O	4- 2 2 3/4	ADVANCED COMP TECH	-	-	
O	24- 6 6 5/8	APPLIED DATA RES.	- 1/2 -	+ 2.17	
O	18- 5 5 5/8	ARISTON LOGIC	- 1/2 -	+ 5.85	
O	40- 26 26 1/2	AUTOMATIC DATA PRG	- 1/2 -	+ 1.91	
O	47- 26 26 1/2	DATA PROCESSING	- 1/2 -	+ 12.50	
O	3- 1 1 1/2	DATA RAMON APPS	- 1/2 -	+ 12.50	
O	10- 3 3 1/2	COMPUTER ENVIR.	- 1/2 -	+ 20.00	
O	30- 10 10 1/2	COMPUTER SCIENCES	- 1/2 -	+ 10.20	
O	34- 26 27 1/2	COMPUTING UNIV. OF SO.	- 1/2 -	+ 12.50	
O	26- 26 27 1/2	COMPUTING & SOFT	- 1/2 -	+ 3.17	
O	9- 3 3 3/4	COMTEX	- 1/2 -	+ 18.75	
O	1- 1 1 1/2	CONSOL ANAL. CNTL	- 1/2 -	+ 9.09	
O	28- 6 6 5/8	DATA FAX/TELE	- 1/2 -	+ 6.90	
O	28- 6 6 5/8	DATA PACKAGING	- 1/2 -	+ 6.90	
O	6- 2 2 7 3/8	DATASTATION SERVICE	- 1/2 -	+ 9.92	
O	5- 5 5 1/2	DATASTAR	- 1/2 -	+ 3.70	
O	16- 6 6 6	DATA COMLOG	- 1/2 -	+ 10.00	
O	20- 5 5 5/8	DATA/COMPSYS	- 1/2 -	+ 2.08	
O	16- 5 5 5/8	DATA/INFORMATICS	- 1/2 -	+ 9.44	
O	29- 15 15 1/2	MANAGEMENT DATA	- 1/2 -	+ 4.62	
O	14- 14 14 1/2	MANUFACTURERS ANTS	- 1/2 -	+ 4.62	
O	12- 3 3 1/2	NAT'L COMP. SERVS.	- 1/2 -	+ 6.76	
O	58- 19 19 7/8	PLANNING RESEARCH	- 1/2 -	+ 8.09	
O	14- 14 14 1/2	PROGRAMMING & LOGOS	- 1/2 -	+ 11.54	
O	3- 3 3 3	PROGRAMMING & ST	- 1/2 -	+ 16.22	
O	33- 7 7 3/4	REPLICATING SCIENCES	- 1/2 -	+ 14.00	
O	14- 14 14 1/2	REPLICATING SCIENCES	- 1/2 -	+ 14.00	
O	27- 8 8 1/2	TRS COMP INC.	- 1/2 -	+ 27.47	
O	2- 1 1 1	UNISYS	- 1/2 -	+ 20.53	
O	19- 9 23 23 1/2	UNIVERSITY COMP.	- 1/2 -	+ 20.53	
O	20- 5 5 5/8	URS SYSTEMS	- 1/2 -	+ 20.53	
O	19- 5 5 5/8	URS TIME SHARING	- 1/2 -	+ 20.53	

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